May 1981
vol 7, no 5
$2.50

creative computing

the #1 magazine of computer applications and software

Bombproof Data Entry

Write That Program!

Thesaurus Program

Mind-amusic from Microcomputers

Apple Modification for Handicapped

Evaluations:
- 6 Investment Packages
- TI Extended Basic
- Mushroom for North Star
- Eastern Games

...l Finance and
...usiness Computing

...uide to
...siness Computers
...n Analysis
...alc
...n Mutual Funds
...ounting
...ge Forecasting
... of the Future
...nt Inn Syndrome
...omy Comparison Program
- Determining Economic Order Quantity

80306 17424 60958 1
CO 80306

© truman 1981

NEW!

THE COMPLETE COMPUTER CATALOG

TSE/HARDSIDE

TSE/HARDSIDE

Save $4.

If you or a friend would like to subscribe to our TSE/HARDSIDE Complete Computer Catalog, simply send $2.00 and receive a $4.00 certificate good toward your first purchase of software, hardware, books or specialty items from TSE/HARDSIDE. I have a (check one) ☐ TRS-80, ☐ APPLE ☐ ATARI ☐ PET. A reasonable facsimile of this coupon will be accepted.

Name _____

Address _____

City _____ State _____ Zip _____ CC 4/81

MAIL TO: 6 South Street Milford, NH 03055

TSE/HARDSIDE

Do it! hardware

READER SERVICE CARD

Coming In June

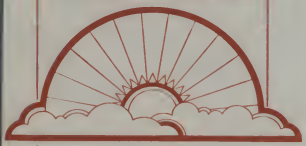
Graphics

- Complete Listing of Android Nim
  Interview with Leo Christopherson
- Computer Graphics in "ALIEN"
- Atari Graphics Made Easy
- OSI Meets Paper Tiger
- Graphics and Animation at NYIT
- Apple Picture Packer
- Hi-Res Graphics for TRS-80
- The Computers of Hollywood
- Graduation Wishes

Reviews

- Apple Graphics Utilities
- Fantasy Games, Part 3
- Computer Warfare
- TC-8 Cassette Operating System and More

Software Techniques of Music Synthesis



Write for Creative Computing

Ever wonder how it would feel to see your name on an article in *Creative Computing*? Why not write one and find out?

Creative Computing seeks high quality editorial features on all aspects of personal computing. We publish a wide range of applications for professional, educational, personal, office and home use. Why not send us your "pet program"? Tell us why you wrote it and how. We'll pay you for it, and others will benefit from using it.

Evaluations are another area in which we excel. But there are many more new products being introduced than our staff can cover with the thoroughness we require. We need additional reviews from people like you who use computers in their homes, offices and classrooms. Tell us (and our readers) about your experiences with Brand X computer, Brand Y peripheral or Brand Z software. People depend on our reviews when deciding which products to buy. Your evaluation can be a great help to many of them.

Listed below you will find our editorial emphasis topics for the remainder of 1981. Are there any that fall within your areas of interest or expertise? We'd like to hear about them! Of course, not all the articles we publish pertain to these topics, so don't feel constrained by them.

And while we're on the subject—what topics would you like us to emphasize in 1982. We're drawing up next year's list right now, and we welcome your suggestions.

Send a self-addressed, stamped envelope for a free copy of our author's guide, or see "Bingo Card Secrets" in the February 1981 issue of *Creative* for more details. We can't put your name in lights, but we can put your ideas in print—and pay you for them!

—Betsy Staples, Editor

Editorial Features 1981

August:
Simulations and models. Simulating both continuous and discontinuous processes. Data Bases. NCC coverage.

September:
Educational applications. Summer CES coverage.

October:
Getting started with a personal computer. Techniques for advanced users too.

November:
Problem solving; programming techniques. Electronic toys and games.

December:
Buying guide to personal computers and consumer electronic products.

Mountain Computer makes more peripherals for the Apple Computer than Anybody.

and . . . a place to put them

INTROL X-10

APPLE CLOCK

SUPERTALKER SD200

ROMWRITER

ROMPLUS+

Music System

A/D+D/A

EXPANSION CHASSIS

CardReader

MOUNTAIN COMPUTER

300 Harvey West Blvd Santa Cruz CA 95060
(408) 429-8600 TWX 910 598-4504

CIRCLE 191 ON READER SERVICE CARD

Financial plans needed tomorrow? Use DESKTOP/PLAN software today.

Personal Software offers you an alternative to burning the midnight oil: DESKTOP/PLAN II,* a professional financial planning software package for Apple® II personal computers. Now enhanced with powerful new features.

In an easy-to-learn and easy-to-use process, DESKTOP/PLAN speeds the preparation of just about any type of financial statement, budget, forecast, projection and analysis.

Faster and less expensive.

If you are currently preparing plans with an accounting pad and a calculator, DESKTOP/PLAN will expand your capabilities. And if you are using a time-sharing system, DESKTOP/PLAN will save you money.

DESKTOP/PLAN's creator patterned the program after time-share planning systems. He realized how powerful and convenient a sophisticated planning program can be when adapted to a personal computer. And thousands of users have proven how right he was.

No programming needed.

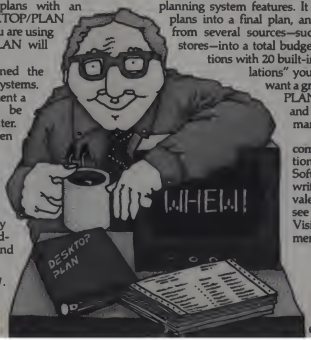
DESKTOP/PLAN is designed for managers; no programming know-how is necessary. You are guided step-by-step through the planning process by "prompts" or requests for column headings and row titles, calculation rules, and the numbers to be calculated. The instruction manual fully explains and illustrates how to build your model.

Your printer produces a finished financial report that looks good enough to carry into the board room. Once the model is constructed, you can play "What if?", changing any of the numbers, recalculating and printing out the new results.

Exceptionally powerful.

DESKTOP/PLAN II includes some exceptionally powerful planning system features. It consolidates portions of several plans into a final plan, and it summarizes identical plans from several sources—such as budgets from a chain of stores—into a total budget. It performs complex computations with 20 built-in calculations plus "custom calculations" you can easily write yourself. If you want a graph, it does that, too. DESKTOP/PLAN can also operate with VisiCalc® and ApplePlot,* creating a family of management productivity software.

Ask your Personal Software computer retailer for a demonstration. For his name, phone Personal Software Inc. at 408/745-7841, or write 1330 Bordeaux Drive, Sunnyvale, CA 94086. While you're there, see our other Productivity Products: VisiCalc and CCA Data Management Systems.



See us in Chicago at NCC—booth 881.

*Apple and ApplePlot are trademarks of Apple Computer, Inc.

PERSONAL SOFTWARE

CIRCLE 170 ON READER SERVICE CARD

In This Issue...

evaluations & profiles

17 **TI Extended Basic** ..... *Linderholm*
The sleeping giant stirs

20 **Fantasy Games** ..... *Luber*
Adventure, Mission Asteroid, Wizardry, et al.

26 **Buyer's Guide** .....
Comparison of small business computers

28 **Mailroom** ..... *Kasser*
Mailing list for Northstar

30 **Financial Programing Language** ..... *Callan*
New package for TRS-80 Model II

76 **Six Programs for the Investor** ..... *Barkaszi*
Software for TRS-80 and Apple

articles

32 **Level (II) Headed Business** ..... *Blechman*
A small business success story

40 **An Open Letter** ..... *Henderson*
From a businessman to the small computer industry

46 **Metamorphosis** ..... *Miller*
The office of the future

52 **Electronic Fantasy** ..... *Yob*
An exercise in speculative design

60 **The Vermont Inn Syndrome** ..... *Doering*
Or how not to sell your own software

62 **Tero's Apple** ..... *Sand*
Adaptation for the handicapped programmer

64 **Write That Program!** ..... *Readers*

68 **Macromusic from Micros** ..... *Spiegel*
Music synthesis past and future

fiction & foolishness

82 **This Way to the Stars** ..... *Payack*

84 **Bear with Me a Little While** ..... *Banks*

the cover

The cover is a painting by Timothy Truman of Stanhope, NJ.

MAY, 1981 **VOLUME 7, NUMBER 5**

Creative Computing magazine is published monthly by Creative Computing, P.O. Box 789-M, Morristown, NJ 07960 (Editorial office 39 East Hanover Ave Morris Plains, NJ 07950 Phone (201) 540-0445)

Domestic Subscriptions 12 issues $20, 24 issues $37, 36 issues $53 Send subscription orders or change of address (P.O Form 3575) to Creative Computing P.O Box 789-M, Morristown, NJ 07960 Call 800-631-8112 toll-free (in New Jersey call 201-540-0445) to order a subscription (to be charged only to a bank card)

Controlled Circulation paid at Richmond, VA 23228

Copyright © 1981 by Creative Computing All rights reserved Reproduction prohibited Printed in USA

applications & software

PERSONAL FINANCE AND SMALL BUSINESS COMPUTING

86 **Determining Economic Order Quantity** ..... *Lowerre*
Keeping inventory costs under control

96 **Break Even Analysis with VisiCalc** ..... *Blank*

100 **Trend 3** ..... *Jackson*
Short-range forecasting

108 **Investing in Mutual Funds** ..... *Browning and Clemens*
An unusual strategy

118 **Setting the Records Straight** ..... *Johnson*
Home accounting made easy

126 **Fuel Economy** ..... *DuFon*
Comparison of two cars

128 **Displaying Numbers in Tabular Format** ..... *Magree*

130 **CatCard** ..... *Rogowski*
A cataloguing and cross-referencing system

136 **Executive Privilege** ..... *Young*
Backing up with Apple EXEC

144 **Bombproof Data Entry** ..... *Luca*
A revision

146 **How to Solve It** ..... *Piele*
The water jug problem

156 **Applesaurus & The World Brain** ..... *Kelly*
A synopsis of linguistic categories

departments

6 **Et Cetera** ..... *et al*

8 **Input/Output** ..... *Readers*

14 **Dateline: Tomorrow** ..... *Ahl*
News and views

168 **Attention: Program Authors**
Computer Store of the Month .....

170 **Compleat Computer Catalogue** ..... *Staples*

186 **Puzzles & Problems** ..... *Townsend*

188 **Compendium** ..... *Mullin*

190 **Software Legal Forum** ..... *Novick*

192 **Intelligent Computer Games** ..... *Levy*

200 **Apple Cart** ..... *Carpenter*

208 **Personal Electronic Transactions** ..... *Yob*

210 **Outpost: Atari** ..... *Dunn*
Stereo, string arrays and word processing

214 **TRS-80 Strings** ..... *Gray*
Keybounce, publications, software

220 **Book Reviews** ..... *Gray*

226 **Index to Advertisers** .....

staff

Publisher/Editor-in-Chief — David H. Ahl

Editorial Director — George Blank

Editor — Elizabeth Staples

Associate Editor — David Luber

Contributing Editors — Charles Carpenter, Thomas W. Dwyer, Stephen B. Gray, Glenn Hart, Stephen Kimmel, Harold Novick, Peter Payack, Alvin Toffler, C. Barry Townsend, Gregory Yob, Karl Zinn

Editorial Assistant — Peter Fee

Secretary — Elizabeth Magin

Production Manager — Laura MacKenzie

Art Department — Diana Negri, Chris Demilia, Joanne Fogarty, Alan Rowe Kelly

Typesetters — Jean Ann Vokoun, Maureen Welsh

Advertising Sales — Renee Fox Christman, Charles Coffin, Jeff Horchler

Marketing Coordinator — Barbara Garris

Creative Computing Press
Managing Editor — Burchenal Green

Software Development — Chris Vogeli, Bob Calian, William Kubeck, Kerry Shetline, Owen Linderholme

Software Production — John White, Rita Garner, Heather Everett, Bill Rogalsky

Operations Manager — William L. Baumann

Personnel & Finance — Patricia Kennelly

Bookkeeping — Joan Swihart, Ethel Fisher

Retail Marketing — Jennifer Burr, Laura Gibbons, David Rogers

Circulation — Suzanne Guppy, Frances Miskovich, Dorothy Staples, Moira Fenton, Carol Vita

Customer Service — Patricia Brown

Office Assistants — Rosemary Bender, Linda McCathern, Marie Groves, Diane Feiler, Mary McNiece

Order Processing — Jim Zecchin, Rick Mullin, Ralph Loveys, Gail Harris, Toby Loyd, Ronald Thorburn

Shipping & Receiving — Mark Ello, Ronald Antonaccio, Scott McLeod, Nick Ninni, Mark Archambault, Mike Gribbon

advertising sales

Advertising Coordinator
Renee Christman
Creative Computing
P.O. Box 789-M
Morristown, NJ 07960
(201) 540-0445

Western States, Texas
Jules E. Thompson, Inc.
1290 Howard Ave., Suite 303
Burlingame, CA 94010
(415) 348-8222

Southern California
Jules E. Thompson, Inc.
2560 Via Tejon
Palos Verdes Estates, CA 90274
(213) 378-8361

Mid-Atlantic, Northeast
CEL Associates, Inc.
27 Adams Street
Braintree, MA 02184
(617) 848-9306

Midwest
Ted Rickard
435 Locust Rd.
Wilmette, IL 60091
(312) 251-2541

New York Metropolitan Area
Nelson & Miller Associates, Inc.
55 Scenic Dr.
Hastings-on-Hudson, NY 10706
(914) 478-0491

Southeast
Paul McGinnis Co.
60 East 42nd St.
New York, NY 10017
(212) 490-1021

attention authors

Creative Computing will not be responsible for the return of unsolicited manuscripts, cassettes, floppy disks, program listings, etc. not submitted with a self-addressed, stamped envelope.

OK to reprint

Material in Creative Computing may be reprinted without permission by school and college publications, personal computing club newsletters, and nonprofit publications. Only original material may be reprinted, that is, you may not reprint a reprint. Also, each reprint must carry the following notice on the first page of the reprint in 7-point or larger type (you may cut out and use this notice if you wish):

Copyright © 1981 by Creative Computing, 39 E. Hanover Ave., Morris Plains, NJ 07950. Sample issue $2.50, 12-issue subscription $20.

Please send us two copies of any publication that carries reprinted material. Send to attention: David Ahl.

microform

Creative Computing is available on permanent record microfilm. For complete information contact University microfilms International, Dept. F.A., 300 North Zeeb Road, Ann Arbor, MI 48106 or 18 Bedford Road, London WC1R 4EJ, England.

foreign customers

Foreign subscribers in countries listed below may elect to subscribe with our local agents using local currency. Of course, subscriptions may also be entered directly to Creative Computing (USA) in U.S. dollars (bank draft or credit card). All foreign subscriptions must be prepaid.

Many foreign agents stock Creative Computing magazines, books, and software. However, please inquire directly to the agent before placing an order. Again, all Creative Computing products may be ordered direct from the USA—be sure to allow for foreign shipping and handling.

CANADA

	Surface	Air
1-year	C $29	n/a
2-year	55	n/a
3-year	80	n/a

Micron Distrib
409 Queen St W
Toronto, OT M5V 2A5, Canada

AUSTRALIA

	$A	$A
1-year	28	52
2-year	54	101
3-year	78	150

ELECTRONIC CONCEPTS PTY. LTD
Attn: Rudi Hoess
Ground Floor 55 Clarence St
Sydney, NSW 2000, Australia

ENGLAND

	£	£
1-year	12 50	21 00
2-year	24 00	41 00
3-year	34 50	81 00

CREATIVE COMPUTING
Attn: Hazel Gordon
27 Andrew Close
Stoke Golding, Nuneaton CV13 6EL

FRANCE

	F	F
1-year	120	201
2-year	229	395
3-year	332	586

SYBEX EUROPE
14/18 Rue Planchat
75020 Paris, France

GERMANY

	dm	dm
1-year	52	86
2-year	98	166
3-year	141	250

HOFACKER-VERLAG
Ing. W. Hofacker
8 Munchen 75
Postfach 437, West Germany

HOLLAND, BELGIUM

	f
1-year	119
2-year	231
3-year	332

2XF COMPUTERCOLLECTIEF
Attn: F. de Vreeze
Amstel 312A
1017 AP AMSTERDAM, Holland

ITALY

	IL	IL
1-year	34,000	52,000
2-year	53,000	72,000
3-year	72,000	87,500

ADVEICO S.R.L.
Via Emilia Ovest, 129
43016 San Pancrazio (Parma) Italy
Attn: Giulio Bertellini

JAPAN

	Y	Y
1-year	6,900	11,800
2-year	13,300	23,100
3-year	19,300	34,400

ASCII PUBLISHING
Aoyama Building 5F
5-16-1 Minami-Aoyama, Minato-Ku
Tokyo 107, Japan

PHILIPPINES

	P	P
1-year	214	383
2-year	413	718
3-year	596	1059

INTEGRATED COMPUTER SYSTEMS, INC.
Suite 205, Limketkai Bldg., Ortigas Ave.
Greenhills P.O. Box 483, San Juan
Metro Manila 3113, Philippines

SWEDEN

	Kr	Kr
1-year	123	206
2-year	236	405
3-year	340	603

HOBBY DATA
Attn: Jan Nilsson
Fack
S-200 12 Malmo 2, Sweden

OTHER COUNTRIES

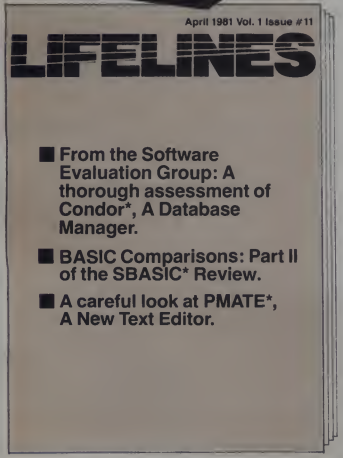
	US$	US$
1-year	29	50
2-year	55	97
3-year	88	143

CREATIVE COMPUTING
P.O. Box 789-M
Morristown, N.J. 07960, USA

Lifelines.

The serious publication for the serious software user.

WHAT LIFELINES READERS READ ABOUT IN APRIL


April 1981 Vol. 1 Issue # 11
LIFELINES
■ From the Software Evaluation Group: A thorough assessment of Condor*, A Database Manager.
■ BASIC Comparisons: Part II of the SBASIC* Review.
■ A careful look at PMATE*, A New Text Editor.

Lifelines is the publication dedicated to keeping you up-to-date on happenings in the explosive micro-computer world.

Lifelines specializes in news about software for CP/M* and similar operating systems.

Lifelines does it with a guarantee of high level, in-depth analysis of software uses and capabilities.

Lifelines does it with valuable information necessary to make intelligent software buying decisions.

Lifelines does it with the latest information on The CP/M Users Group.

Lifelines does it with thought provoking discussions on many of the more controversial issues facing computer users.

How can you live without Lifelines?

Subscribe Now!

$18.00 for twelve issues: U.S., Canada, and Mexico.
$40.00 for twelve issues: all other countries.
$2.50 for each back issue: U.S., Canada, and Mexico.
$3.60 for each back issue: all other countries.

All orders must be pre-paid by check to: LIFELINES, 1651 Third Avenue, New York, N.Y. 10028—Checks must be in U.S. $, drawn on a U.S. bank. Or use your VISA or MASTERCARD. Call (212) 722-1700

LIFELINES

*Condor is a trademark of Condor Computer Corporation.
*SBASIC is a trademark of Topaz Programming.
*PMATE is a trademark of Phoenix Software Associates, Ltd.
*CP/M is a trademark of Digital Research, Inc.

CIRCLE 235 ON READER SERVICE CARD

es...notices..

ACT

The Action Committe on Technology (ACT) has announced that *Creative Computing* Publisher David Ahl has accepted an invitation to sit on the Advisory Board of the organization.

ACT is a science-related lobbying organization founded to reverse the decline in priority of science and technology in federal government funding and policy decisions. ACT is lobbying Congress on a wide range of legislation addressing science, technology, basic research, and science education (including computer literacy).

Individual membership costs $15 per year and includes a subscription to ACT's quarterly bulletin on its lobbying activities.

Action Committe on Technology, P.O. Box 488, Charlottesville, VA 22902.

Summer Computer Simulation Conference

The Summer Computer Simulation Conference will be held in Washington D.C. July 15-17, 1981. Sponsored by the Society for Computer Simulation, the Instrument Society of America, and nine affiliated Societies, this conference will present over forty sessions on topics of computer simulation technology and applications. For more information contact William E. Buchanan, Applied Physics Laboratory, Johns Hopkins Road, Laurel, MD 20810.

AI Conference

The Seventh International Joint Conference on Artificial Intelligence will take place August 24 to 28, 1981, on the campus of the University of British Columbia, in Vancouver, B.C., Canada. The international artificial intelligence conference will examine computer applications of medical diagnosis, computer aided design, robotics, programmable automation, speech understanding, vision, etc.

For conference information contact: Richard Rosenberg, Computer Science Dept., U.B.C., Vancouver, B.C., Canada V6T 1W5, (604) 228-3061

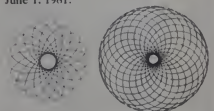
Personal Computer Arts Festival

The Personal Computer Arts Festival committe invites everyone interested in: microcomputer music synthesis, computer composition tools, digital sound synthesis and signal processing, computer-generated visual art (video, film, plots, prints, sculpture, etc.) and other computer-based creations to talk, demonstrate, display, or perform at PCAF-81 in Philadelphia, August 28-30, 1981.

Special groups will be held as suggested by participants.

To participate in PCAF-81, send a 1/2 page description of your presentation topic or performance and include tapes, prints, or slides wherever possible (to be returned). Information should be received before July 1, 1981.

A resource guide to computer music and graphics is being compiled for the Festival. Contributions for the guide should be sent to PCAF-81 no later than June 1, 1981.



PCAF-81 is held in conjunction with the Personal Computing '81 Show at the Philadelphia Civic Center. This show includes one of the largest exhibitions of small computer systems in the country.

Send all material to: PCAF-81, Box 1954, Philadelphia, PA 19105.

Computer Camp

Creative Computing will sponsor a summer day camp program for young people aged 10 to 17 at its headquarters in Morris Plains, NJ.

The program includes three levels of instruction ranging from computer literacy and basic programming skills to special applications in art, graphics and music synthesis. Participants will have access to a variety of different microcomputers and peripherals housed in the Creative Computing Software Development Center.

The camp will consist of four two-week sessions beginning the last week in June and extending through the middle of August. Students will be grouped by age and experience.

For further information, write Creative Computing, Attention: Larry Koss, 39 E. Hanover Ave., Morris Plains, NJ 07950, or call (201) 540-0445 after 1:00 p.m.

Buzzy Hal Gerhardt

Are You And Your Banker Ready To Get Together?

You are if you have The Analyzer™ from Dakin5 Corporation

When your banker asks you for:

- Detailed monthly cash flow projection reports
- An analysis of your sources and uses of funds for the past year
- Quarterly comparisons of your balance sheets and income statements

do you and your accountant spend days or weeks trying to provide this information in a clear, concise manner, only to find that some of the information is impossible to generate manually?

The Analyzer can help you solve these problems by assembling and organizing the mass of numbers you must evaluate each month.

The Analyzer takes the financial information produced each month by The Controller™, organizes it, then generates 16 decision making reports. These reports allow you to plan, compare, evaluate, measure and control your business activities on a monthly, quarterly or yearly basis.

With the Analyzer you can now use The Controller as more than an automated accounting system. You can use it as a tool to make better management decisions, and to represent your company as successful and well managed.

The Analyzer requires an Apple microcomputer with 2 disk drives, 48K RAM and The Controller 1.1.

Available at your local computer retail store, or contact Dakin5 Corporation, P.O. Box 21187, Denver, Colorado 80221, Phone: 800-545-0463 for your nearest retailer.

The Controller and The Analyzer are registered trademarks of Dakin5 Corporation. The Controller is marketed by Apple Computer Inc. Apple is a registered trademark of Apple Computer Inc. Photo

DAKIN5 CORPORATION

P.O. Box 21187 Denver, CO 80221 Phone: 800 525-0463

CIRCLE 120 ON READER SERVICE CARD

The Dividing Line

Dear Editor:

The two articles on high-precision division (October 1980 *Creative Computing*) present an interesting contrast.

The first article, by John E. Bailey, gives a lucid explanation of the algorithm involved. This is then implemented in a short, clear Basic program which can be used to test the process, and which might readily be adapted for inclusion in one's own program as a subroutine.

The second article, by Pat Fitzgerald, attempts to realize the algorithm in a faster program, by biting off more than one digit at a time. Fitzgerald gives us a considerably longer and more complex program, with dubious extra features such as checking size of the input variables. The basic algorithm is obscured from view by these extras. The program uses a dangerous method of determining how many suppressed leading zeros to put back (dangerous because it relies upon exactness of a calculation involving logarithms and real division). All this might be forgiven if the program worked right.

Unfortunately it does not. The sample run itself has two ovbiously incorrect results in it. Dividing 0.001 by 12 will produce the value 0.000 083 333 333 ..., continuing forever with threes; and dividing 1979 by 9791 will also produce a repeating decimal that does NOT terminate in zeros.

The author seems to have confused the fact that a particular computer expresses certain decimal numbers in decimal (rather than scientific) form, with the question of whether it holds (and calculates with) the EXACT value involved. The PDP 11/10 apparently does not do this for numbers as large as the sample program required. Also, in attempting to do exact division with non-integer input values, Fitzgerald has presumed the computer uses an exact internal value; most small computers would not do this, and quite likely the PDP does not.

Lurking in Fitzgerald's program is one good idea: to compute several digits of the answer at once. This will work properly, if all the computations work with integers below the integer limit of your computer. (This is the number, below which all integer operations are calculated exactly. On most Basics, this number is rather high if you are using real variables, but might be tricky to ascertain; using integer variables, the number is lower, but easier to find: just take the maximum legal integer.)

To properly implement a multi-digit approach, you must verify one important condition: the maximum possible remainder from a division (using the divisor given), times the power of 10 you are using (Bailey uses power 1, Fitzgerald uses power 7), must not be larger than the integer limit. For example, if your integer limit was 32767, and you wanted to calculate 3 digits at a time (thus using 1000 as a multiplier in Bailey's line 80, rather than 10), the maximum permissible remainder would be 32, and therefore the maximum allowable divisor would be 33.

(One should notice, by the way, that even Bailey's program will fail if the input divisor is close to the computer's integer limit.)

Calculating several answer digits at a time exacts a small price in complicating the output: you must assure that suppressed leading zeros get put back where they belong. (E.g., using 1000 as a multiplier, if you got a quotient of 17, you would have to print it as "017" in the decimal digits of the answer.) A convenient way to handle it, especially if your Basic puts a blank before or after each value printed (as both Bailey's and Fitzgerald's seem to do), is to put the output digits into a string. When the calculation is complete, the string can then be printed, using any convenient formatting. Depending on the features of your Basic, you might be able to avoid the worry of supplying suppressed zeros by initially making the string consist of all zeros, and then selectively replacing designated digits with the results of calculation.

May I express a hope for more articles like Bailey's and fewer like Fitzgerald's?

Robin Ault
Concolor Allied Technical Services
45 Dexter Road
Newtonville, MA 02160

Speaking of putting numbers in strings, which is a useful technique for high-precision calculations, see the article "Displaying Numbers in Tabular Format" by Melvyn Magree on page 128 of this issue.

Creative first examined the problems of high-precision arithmetic in the article "Computing Factorials—Accurately" by Walter Koetke in Vol. 1, No. 3. Unfortunately this issue is no longer available, but the article can be found in The Best of Creative Computing - Volume 1 on page 172.

Two other articles in the August 1979 issue, "Accuracy Plus" by Bruce Barnett and "Double Precision" by Delmar Hinrichs also deal with multiple-precision arithmetic.—DHA

Beat The Socks Off Your Computer's Quarterback—You Hope

Time. That's a rough thing. But now it's on your side in Tuesday Morning Quarterback™ by EPYX. Because now you can call the plays and run them yourself. You pick the pass, dive, run or kick. You're in control. You're the coach. You're the quarterback. You're the one who gets to call the shots. You're the one who gets to call the shots. You're the one who gets to call the shots

Apple, in a class by itself.

It's no surprise that there are more Apples in education than any other computer:

The Minnesota Educational Computing Consortium (MECC) that serves 97% of the school districts in Minnesota has chosen Apple as its *exclusive* personal computer since 1978. Minnesota's students love the Apple, because it's the personal computer that helps make it easy for them to learn everything from earthquake prediction and physics to mathematics and career guidance.

In Alaska, Apples are being used as part of an experimental educational telecommunications project. Students in remote villages learn with Apple, while their test scores are transmitted via satellite to Juneau. There, teachers can monitor the progress of many students living hundreds of miles away.

Alliance College in Pennsylvania couldn't afford to buy a large computer center. Realizing the importance of computer literacy in the '80s, Alliance purchased several Apples. The result? Interest in computer science skyrocketed.

Administrators are impressed that the Apples are highly cost effective, especially compared to big computers. And educators are amazed that the Apples are such reliable performers — semester after semester after semester.

North Carolina adopted the Apple for use in over 2,000 elementary, secondary and vocational schools throughout the entire state. Price, performance and available courseware made all the difference.

In Texas, state universities like North Texas State picked Apple to teach programming languages like BASIC and Pascal to both students and educators. The Houston school district (the largest school district in the United States) adopted Apples for a revolutionary way to teach remedial math and remedial reading.

Throughout North America, from British Columbia to the 13 campuses of Mexico's Monterrey Institute of Technology,

the Apple computer is earning straight A's. Because of Apple's ease of expandability, service and dramatic educational innovations like the new Apple PILOT language, decision makers across the country pick Apple personal computers for their classrooms. To learn all the reasons why Apple is in a class by itself, see your local Apple dealer. For names and addresses, call **800-538-9696**. In California, **800-662-9238**. Or write:

Apple Computer
10260 Bandley Drive
Cupertino, CA 95014.

apple computer inc.

CIRCLE 111 ON READER SERVICE CARD

put...input/output...in

Irrational Approach

Dear Editor:

The December 1980 issue of *Creative Computing* carries a letter to you from J. Warshawsky, Ph.D. There he points out that the ratio 355/113 is an excellent approximation to Pi. He appears apologetic about its lack "of mathematical rigor and elegance."

It may interest some of your readers to know that the fraction quoted has a respectable and rigorous mathematical basis. (As to 'elegance" that is a subjective matter.)

It is widely known that Pi can be expanded into a variety of infinite series. Less well known is that it can also be expanded in a variety of infinite continued fractions. For example. if the one given below

$$3+\cfrac{1}{7+\cfrac{1}{1+\cfrac{1}{1+r}}}$$

is terminated with r=0 and simplified. the result is 355/113. Extending the series by one term, r=1/292, yields the ratio 103, 993/33, 102. This gives a relative accuracy of -3 parts in 10 billion. Going in the other direction. the series 3+1/7, which I learned in grade school. is surprisingly good. the relative error being only 3 parts in 10 thousand.

Emory Lakatos
404 9th St.
Santa Monica. CA 90402

Capital Idea

Dear Editor:

I enjoyed reading the article by Roger Crites on the CBM 2022 printer in your December. 1980 issue. We use PETs in our elementary teacher education program and have found the CBM 2022 to be a versatile printer. Mr. Crites mentioned that he could not properly list programs with lower-case characters and indeed we were unable to find information on how to do this from Commodore's documentation or from our usually helpful computer store. However. through experimentation we have found that the following sequence of commands does the trick:

```
OPEN 1, 4

OPEN 2, 4, 7

PRINT#2,  CHR$(17)

CMD 1

LIST
```

Given Commodore's penchant for changing ROMs. the only way to find out if this works on a particular printer is to try it.

William H. Kraus
Assistant Professor of Education
Wittenberg University
Springfield. OH 45501

Grand Slam

Dear Editor:

I can't believe that you published an article about bridge programs that states only two are available. Dynacomp sells an excellent program that bids and plays duplicate or contract bridge. I have been using it for a year and it works very well. The price is $17.95 for the cassette version.

Robert J. Morrisette
2640 Shadowvale Way
San Jose. CA 95132

Trail Blaiser

Dear Editor:

In the March 1979 issue was a short article by Jordan Mechner on the generation of Pascal's Triangle using programs in Basic and APL (pages 112 and 113). Many years ago when I was in high school I had to do the same thing in my Fortran class. Having just learned Pascal. I thought that a program for Pascal's Triangle should *of course* be written in Pascal!

So I translated my Fortran program to Pascal and it ran the very first try. This allows me to slip a little more Pascal in your magazine.

```
*list /triang.p

program pascals_triangle ( input, output );

var
    triangle                    : array [ 1..13, 1..13 ] of integer;
    i, j, k, l   -              : integer; {for loop conters}
    spaces                      : integer;

begin
    for i := 1 to 13 do
        begin
            triangle[ 1, i ] := 0;
            triangle[ i, 1 ] := 1;
        end;
    for j := 2 to 11 do
        begin
            for k := 2 to 13 do
                triangle[ j, k ] := triangle[ j-1, k-1 ] + triangle[ j-1, k ];
        end;
    spaces := 30;
    for j := 1 to 13 do
        begin
            for i := 1 to spaces do
                write (    );
            spaces := spaces - 2;
            for k := 1 to j do
                write ( triangle[ j, k ]:4 );
            writeln;
        end;
end.

*pas /triang.h
                                1
                              1   1
                            1   2   1
                          1   3   3   1
                        1   4   6   4   1
                      1   5  10  10   5   1
                    1   6  15  20  15   6   1
                  1   7  21  35  35  21   7   1
                1   8  28  56  70  56  28   8   1
              1   9  36  84 126 126  84  36   9   1
            1  10  45 120 210 252 210 120  45  10   1
          1  11  55 165 330 462 462 330 165  55  11   1
        1  12  66 220 495 792 924 792 495 220  66  12   1
*
```

The machine I chose to write my program on is a Honeywell System 66 timeshare. the Pascal is version 7 (for whatever that's worth).

What can you tell me about Ada?

Jim Eärenlûindil Trethewey
312 Shell Hall
Oregon State University
Corvallis. OR 97332

Watch these pages for a major description of Ada. — DHA

put...input/output...in

Squeaking Through

Dear Editor:

Charles Congdon's troubles with the "Mouse" program (July, 1980) described in his letter in the November issue came as a suprise to me. We have been using the "Mouse" program for nearly three years now just as it was printed and have had no problems with it. In examining Mr. Congdon's proposed "solution" I believe that his problems involved an idiosyncrasy of some Basic dialects which might be of interest to your readers.

Mr. Congdon's problems involve line 700 of the "Mouse" program which reads:

```
700  H2%=H%+H1%
     \ V2%=V%+V1%
     \ IF H2%>=W4% OR V2%>=G% OR V2%<1% THEN N2%=FNR2%
     \ N%=M%(N2%)
     \ GO TO 590
```

Mr. Congdon claims that because of the GOTO statement at the end of line 700 it is impossible for the program to get past line 700. However, in DEC Basic-Plus (and a variety of other Basic dialects) when an IF...THEN statement appears in the middle of a multiple statement line (as is the case here) and the condition evaluated by the IF...THEN statement is false all the rest of the statements on the multiple statement line are skipped and control is transfered to the next logical line in the program. In this case if none of the three equalities in the above IF...THEN statement is true the program jumps to line 710 bypassing the GOTO statement which occurs at the end of line 700.

Why then did Mr. Congdon's copy of "Mouse" fail to run properly? In examining his solution to the problem he was having I noticed that he had used a variant form of IF statement which is available in Basic-Plus. The IF statement was put in the form:

```
\ N2%=FNR2% IF H2%>=W4% OR V2%>=G% OR V2%<1%
```

This is perfectly correct and in Basic-Plus is usually preferable because it uses less code and executes faster than the standard IF...THEN statement. When this form is used the statements following the IF statement are executed regardless of whether the condition tested by the IF statement is true or false. Thus, the GOTO statement at the end of line 700 cannot by bypassed and the program enters an endless loop.

It appears to me that Mr. Congdon's version of "Mouse" will function properly, and I am sure his comments will be a service to anyone attempting to translate "Mouse" into a dialect of Basic that handles IF statements differently than DEC Basic-Plus. His version of line 700 also has the advantage of being more explicit which is probably an aid to transportability.

Thank you for your excellent magazine. I have learned a great deal from its pages.

Jerry W. Lee, PhD
Department of Psychology
Loma Linda University
Riverside, CA 92515

Baudot Update

Dear Editor:

Baudot is alive and well and living in:

Applied Communications Corp. (415) 592-1622 voice or 1623 TTY (ASCII/BAUDOT). Has intelligent modem which does both codes. Run by the deaf.

Translator Programs: P.L. Emerson, 3707 Blanche (sic), Cleveland Heights, Ohio 44118, or Don Lancaster's *The TV Typewriter Cookbook*.

The Handicapped Education Exchange (of AMRRD) contact Dick Barth, (301) 861-7372, (TTY ASCII/BAUDOT).

TTY/VOICE Emergency Hotline for Medical emergency information and TTY to VOICE police, ambulance and fire call translation and assistance nationwide: 800-446-9876 (University of Virginia).

National Center for Law and the Deaf, c/o Gallaudet College, Washington D.C. 20002.

Teletypewriters for the Deaf, P.O. Box 28332, Washington D.C. 20005.

Many words and signs of thanks to all who replied.

D.V Williams
OmniCom Associates
5 Wildflower Drive
Ithaca, NY 14850

There's No Place Like Home

Dear Editor:

I found the excerpt from Alvin Toffler's new book "The Third Wave" to be exceptionally interesting. I am by profession a free-lance classical musician.

During my first programming job in Southern California, I often had the option of doing work at home by using a Texas Instruments portable terminal and dialing up the computer center. I often preferred to do this because I enjoyed working alone with little or no distractions to bother me, and I also objected to the 50 minute commute and accompanying gas bill.

My most recent programming job would have been well suited to "Third Wave" changes. I worked as a programmer/analyst for a Rockefeller Center consulting firm where I worked alone 90% of the time, with most of the balance spent on the telephone to Wall Street clients. Almost of all of my work could easily have been done from my apartment, with only an occasional trip on the subway (YEECH!) to pick up a new project and specs, or to do a demo.

I would venture to guess that one of the major stumbling blocks to an idea such as this catching on is the fact that losing some control probably wouldn't sit too well with most "bosses."

I believe many people would prefer the benefits of fewer distractions and less time lost commuting as well as all other aspects which would ultimately result in increased *productivity*. I truly think that the "Third Wave" approach to the Electronic Cottage is definitely the best approach to the future. I hope that business, and in particular the computer programming business, wakes up and realizes that there are alternatives available that are far better then the 9-5 office job.

Michael Drapkin
90 Pinehurst Ave., Suite 2F
New York, NY 10033

WRITE FOR OUR CATALOG WITH FULL PROGRAM DESCRIPTIONS AND SPECIFICATIONS.

Product LIST NO. 20

The largest selection of software from the world's largest software publisher.

DISK OPERATING SYSTEMS

CP/M CONFIGURED FOR:
APPLE II
DIGITAL MICROSYSTEMS FDC3
DURANGO F-85
HEATH H8 AND H89
ICOM MICRO DISK
ICOM 3712
ICOM 3812
ICOM 4511/PERTEC D3000
INTEL MDS
MICROPOLIS FLOPPY DISK
MITS/ALTAIR
MOSTEK MDX
NORTH STAR
OSI C3
PRO-TECH HELIOS
TRS-80 MODEL I
TRS-80 MODEL II
TRS-80 MODEL III
ZENITH Z89
MP/M FOR INTEL MDS

HARD DISK INTEGRATION MODULES

CORVUS WITH APPLE II SOFTCARD
CORVUS WITH S100 AND TRS-80 MODEL II
ICOM 4511/PERTEC D3000
KONAN PLUS CDC PHOENIX
XCOMP SM/S PLUS CDC PHOENIX
XCOMP DFC10 FOR PERTEC D3000

SYSTEMS TOOLS

BUG AND uBUG
DESPOOL
DISILOG
DISTEL
EDIT
EDIT-80
FILETRAN
IBM/CPM
MAC
MACRO-80
PASM
PLINK
PMATE
RAID
RECLAIM
SID
TRS-80 MODEL II
CP/M
CUSTOMIZATION
DISK
UNLOCK
WORD-MASTER
XASM-18
XASM-48
XASM-65
XASM-68
XMACRO-86
ZDT
Z80
DEVELOPMENT
PACKAGE
ZSID

TELECOMMUNICATIONS

BSTAM
BSTMS

LANGUAGES

ALGOL-60
APL/V80
BASIC-80
(COMPILER)
BASIC-80
(INTERPRETER)
BDS C COMPILER
CBASIC-2
CIS COBOL
CDBDL-80
FORTRAN-80
KBASIC
muLISP
muSIMP
NEVADA COBOL
PASCAL/M
PASCAL/MT
PASCAL/MT+
PASCAL/Z
PL/I-80
SMAL/80
S-BASIC
TINY C
TINY-C TWO
W'SMITH'S C
COMPILER
XYBASIC

LANGUAGE AND APPLICATION TOOLS

BASIC UTILITY DISK
DATASTAR
FABS
FORMS 1 FOR CIS COBOL
FORMS 2 FOR CIS COBOL
MAGSAM III
MAGSAM IV
MDBS.DRS
MDBS.RTL
M/SORT FOR CBASIC
COBOL-80
PEARL
QSORT
STRING BIT
STRING/80
SUPER-SORT
ULTRASORT II

WORD PROCESSING SYSTEMS AND AIDS

MAGIC WAND
LETTERIGHT
MICROSPELL
SPELLGUARD
TEX
TEXTWRITER III
WORD-STAR
WORDINDEX

DATA MANAGEMENT PACKAGES

CONDOR
HDBS
MDBS
MDBS.DRS
WHATSIT?

GENERAL PURPOSE APPLICATIONS

CBS
SELECTOR III-C2
SELECTOR IV

MAIL LIST APPLICATIONS

MAILING ADDRESS (PTREE)
MAIL-MERGE FOR WORD STAR
NAD
POSTMASTER

BUSINESS APPLICATIONS

ACCOUNTS PAYABLE (PTREE)
ACCOUNTS PAYABLE (SSG)
ACCOUNTS RECEIVABLE (PTREE)
ACCOUNTS RECEIVABLE (SSG)
GENERAL LEDGER II (CPAIDS)
GENERAL LEDGER (PTREE)
GENERAL LEDGER (SSG)
GLECTOR FOR SELECTOR III-C2
INVENTORY (PTREE)
INVENTORY (SSG)
PAYROLL (PTREE)
PAYROLL (SSG)

PMATE: EDITOR-IN-CHIEF

"This new-generation text editor is bristling with features previously unavailable on microcomputers, making it ideal for virtually any program or data file editing. **PMATE'S** command set includes expression evaluation, conditional branching, I/O with prompting, and other programming language constructs. **PMATE** makes use of 11 buffers for storage, and includes commands permitting work on more than one text at a time. Unique to **PMATE** is the facility for customizing. Keystroke functions can be redefined, and sequences can be programmed to directly execute macros. Video commands can be changed, and macro functions can be written to emulate another editor, such as WORDSTAR™ or ELECTRIC PENCIL™. **PMATE** provides full sidescrolling, and can be used with virtually ANY video terminal on the market. **PMATE** is an extraordinary editor, combining the power of TECO™ with the convenience of WORDMASTER™. IF you use an editor, you need **PMATE!"**

PMATE $195

MICROSPELL SPELLING CORRECTION PROGRAM AVAILABLE FOR $295.

NUMERICAL PROBLEM-SOLVING TOOLS

ANALYST
FPL
muMATH
STATPAK
T/MAKER

OTHER SPECIALIZED APPLICATIONS

DATEBOOK
ESQ-1
MASTER TAX
PAS-3 DENTAL
PAS-3 MEDICAL
PROPERTY MANAGEMENT (PTREE)
STANDARD TAX

BOOKS AND PERIODICALS

APL—AN INTERACTIVE APPROACH
ACCOUNTS PAYABLE & ACCOUNTS RECEIVABLE-CBASIC
8080/Z80 ASSEMBLY LANGUAGE
THE CP/M HANDBOOK
THE C PROGRAMMING LANGUAGE
FIFTY BASIC EXERCISES
GENERAL LEDGER-CBASIC
LIFELINES
PASCAL USER MANUAL AND REPORT
PAYROLL WITH COST ACCOUNTING-CBASIC
STRUCTURED MICROPROCESSOR PROGRAMMING
USING CP/M—A SELF-TEACHING GUIDE

ACCESSORIES

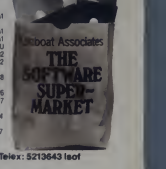
DC 300 DATA CARTRIDGE
HEAD CLEANING DISKETTE
FLIPPY DISK KIT
FLOPPY SAVER

Program names and computer names are generally trademarks or service marks of the author or manufacturing company.
All software products have specific requirements for hardware and additional associated software (e.g. operating system or language).
All Lifebeat software requires CP/M unless otherwise stated.
All products are subject to terms and conditions of sale.
Copyright © 1981 Lifebeat Associates. No portion of this advertisement may be reproduced without prior permission.
The list of available formats is subject to change without notice. In case of uncertainty, call to confirm the format code for any particular equipment.
Prices and specifications are subject to change without notice.

Ordering Information

COMPUTERS SUPPORTED WITH MEDIA FORMAT ORDERING CODES:

ADDS Multivision	RT	Digital Microsystems	A1	IMS 5000	RA	Micropolis Mod II	Q2	Research Machines 8 in	A1
AVL Eagle	RB	Durango F-85	RL	IMS 8000	A1	Morrow Discus	A1	Rex	Q3
Altair 8800	B1	Dynabyte DB8-2	R1	IMSAI VDP-40	R4	Mostek	A1	SD Systems 5.25 in	R3
Altos	A1	Dynabyte DB8-4	A1	IMSAI VDP-42	R4	North Star Single Density	P1	SD Systems 8 in	A1
Apple CP/M 13 Sector	A1	Exidy Sorcerer + Lifeboat	R1	IMSAI VDP-44	R5	North Star Double Density	P2	Televideo 700/5.25 in	RQ
Apple CP/M 16 Sector	RR	CP/M	Q2	IMSAI VDP-80	A1	North Star Quad Density	P3	Spacebyte	A1
BASF System 7100	R7	Heath H8 + H17 H27 disk	P4	ISC Intersector		Nylac Micropolis II	Q2	TEI 5.25 in	R3
Blackhawk Micropolis Mod II	Q2	Heath H89 (Lifeboat CP/M Heath H89 / Magnolia	P4	8063 8360 8863	A1	Nylac Single Density	Q3	TEI 8 in	A1
Blackhawk Single Density	Q3	CP/M	P7	Intertec Superbrain DOS 2	R7	Ohno Scientific C3	A3	TRS-80 Model I	Q3
CDS Versatile 3B	Q1	Helios II	B2	Intertec Superbrain DOS 3	R5	Omikron CB001	T2	STANDARD	R2
CDS Versatile 4	Q2	ICOM 2411 Micro Floppy	R3	Intertec Superbrain QD	RS	Parker PCC 2000	A1	TRS-80 Model I FEC Freedom	RN
COMPAL 80	Q2	ICOM 3712	A1	Kontron PSI 80	RF	Processor Technology Helios II	B2	TRS-80 Model I	R0
CSSM Backup	T1	ICOM 3812	A1	MITS 2200-2002	B1	Quay 500	R0	Micromation	A4
Cromemco System 3	A1	ICOM 4511 5440 Cartridge		MSD 5.25 in	RG	Quay 520	RP	TRS-80 Model II Omikron	
Cromemco Z2D	R6	CP/M 1.4	D1	Meca Delta-1 5.25 in	P6	RAIR Single Density	R9	5.25 in	RM
Delta Systems	A1	ICOM 4511 5440 Cartridge		Micromainon	A1	RAIR Double Density	RE	Zenith Z89 - Magnolia CP/M	
Digi-Log Microterm II	RD	CP/M 2.2	D2	Micropolis Mod I	Q1	Research Machines 5.25 in	R8		



Lifeboat Associates, 1651 Third Avenue, N.Y., N.Y. 10028
(212) 860-0300 Telex: 640693

CIRCLE 234 ON READER SERVICE CARD

In Germany,
Intersoft GmbH, Schlossgärtenweg 5,
D-8045 Ismaning **Telephone 089/966-444 Telex: 5213643 isof**

In Switzerland,
Lifeboat Associates GmbH, Aegeristr 35, CH6340 Baar,
Telefon: 042/31 2931, Telex: 865265 MICO CH

ow...dateline:tomorrow... dat

ON AGAIN, OFF AGAIN AT SEARS

David H. Ahl

Since December 1979, Sears has been selling Atari home computers in its larger stores. Computers were listed in the catalog too but recently pulled from the summer big book because they "showed only a seasonal demand" on a mail-order basis.

Now Sears is planning to jump in with both feet with a chain of stand-alone retail computer stores. Five stores in three market areas will be opened in the third quarter. Rumor has it that two locations will be Dallas and Houston.

What computers will Sears sell? Ray Kassar, president of Atari, claims Sears will sell Atari 400 and 800 units. Sears would only confirm that the Atari line was under evaluation along with Apple and Commodore.

A 'SUPER COMPUTER' SOON--OR EVER?

Estimates have it that IBM has poured $100 million and 10 man centuries of effort into researching the supercomputer and that a working model might be built within two years.

The projected specifications are impressive: 25 to 50 times the computing power of the newly announced 3081 in a CPU the size of a softball (or human brain). It would use the Josephson junction technology and have a cycle time of 1 nanosecond (one billionth of a second).

IBM's immediate goal is slightly more modest: an almost-supercomputer with a cycle time of 2 to 2.5 nanoseconds using a 1000-circuit chip.

Since the superconductivity necessary for a Josephson junction to work requires temperatures close to absolute zero, the computer would probably be the size of a desk in order to house the refrigeration gear.

FIFTH GENERATION COMPUTER FROM JAPANESE/BRITISH LINK?

The new small computers from Japan promise to be highly competitive with American units. But now Japan, possibly in cooperation with the British, is trying to develop a true fifth generation mainframe. This would depart from the principles of von Neumann architecture which have served as the basis of virtually every computer produced since Eniac.

Vying for a major position in the world computer market, Kenneth Baker, U.K. Minister for Information Technology, has been meeting with his counterparts in Tokyo in an effort to forge a bilateral deal to challenge U.S. dominance.

SINCLAIR TO MARKET FLAT SCREEN TV

A flat screen miniature TV is now going into production at the Dundee, Scotland factory of the Timex watch company. The three-inch B/W TV is being produced for Sinclair Research Limited, marketers of the ZX80 microcomputer.

The new TV uses a flattened CRT with the electron gun at the side. The "keystone" distortion effect of this array is compensated for electronically and the resultant flattened picture is viewed through a cylindrical lense in front of the screen.

The TV, which will receive NTSC and PAL signals, is flat and about the size of a VHS video cassette, but slightly bent in the middle. Sets are expected to retail for about $125. A major chain of stores is rumored to be negotiating an order for 350,000 units. Expected market date is summer of 1982.

Sweeten Your Apple II* with the ES/F Mass Storage System

EXATRON'S STRINGY/FLOPPY . . .

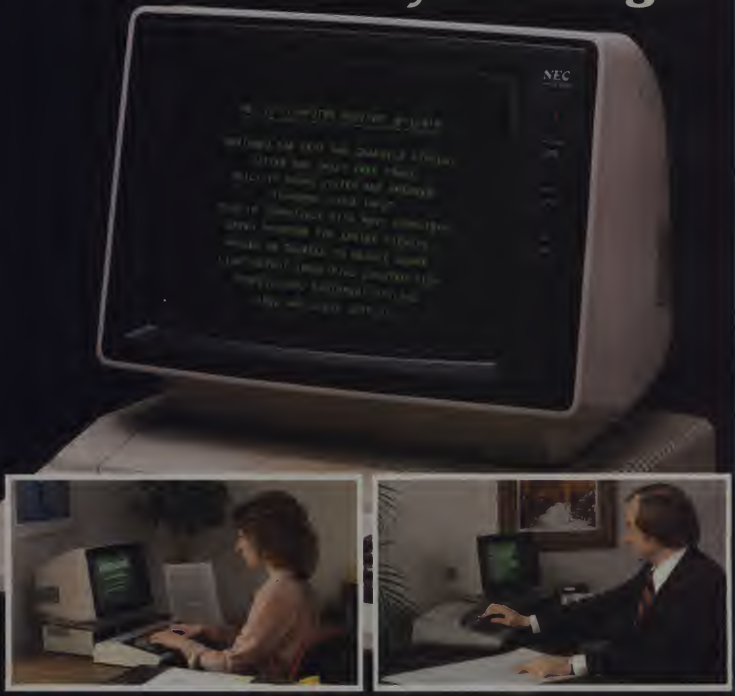
SPEED, CAPACITY AND RELIABILITY FOR ONLY $299.50

CALL OUR HOTLINE
. . . (800)-538-8559

IN CALIFORNIA,
CALL (408)-737 7111

exatron
181 Commercial Street
Sunnyvale, CA 94086

Easy on your Eyes and your Budget



80 character display makes it ideal for word processing and scientific applications.

This high quality professional computer monitor provides sharp, clear display of up to 80 characters by 25 lines of text, making it ideal for word processing as well as standard business applications.

Lightweight industrial grade construction gives maximum portability with reliable operation.

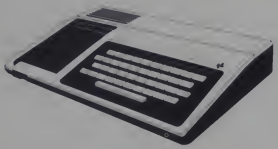
NEC America, Inc.

130 Martin Lane, Elk Grove Village, IL 60007

CIRCLE 253 ON READER SERVICE CARD

Extend Basic from Texas Instruments

Owen Linderholm



Until now the capabilities of the TI 99/4 have been severely limited because the Basic supplied with the machine was not as useful as that supplied with many other machines. Many of its shortcomings still remain, but for certain applications, the TI has become a computer that not only equals but often outdoes its rivals. The old Basic was extremely slow and did not make good use of many of the features of the computer.

Arrays were limited to three dimensions, multiple statement lines were impossible, graphics handling was possible but difficult, and many commands considered standard on other computers were either absent or available only in a limited form. While some of these problems remain, others have been solved and a few new commands never dreamt of have been added.

The new Basic comes (in it's preliminary form) as a black box, about half the size of a disk drive, which plugs into the ROM socket on the front of the computer. It costs approximately $100 and is worth every penny.

Some of the more advanced features include subroutines which operate exactly like Fortran subroutines, graphics which operate independently of program control and a Basic which does most of the things we have come to expect from Microsoft Basic.

The manual that comes with the Basic seems to include everything in the "User's Reference Guide," plus descriptions of the new commands. It lists near the beginning all the changes that take place when the new ROM is plugged in. There is a long list of new instructions, functions and commands. Also, at the end are mentioned the disadvantages that accompany the new Basic. These include a loss of 864 bytes, a loss of 16 user programmable characters and the inability of some TI Basic programs to run in TI Extended Basic. So far I have not been able to find anything else. Graphics buffs who think that the loss of 16 programmable characters is serious are advised to reserve judgement.

Taking some of the less exciting features of the Basic first, I will look at the ACCEPT statement. This is a very advanced form of the INPUT statement and allows you to specify input fields anywhere on the screen, clear the screen before input, beep, put default values in the input field and verify that the data input is of the type required, all in one statement. The DISPLAY statement has been improved to allow one to do most of these things with output.

Other improvements are: multiple statement lines, with :: as the separator; the inclusion of the command RUN as a program statement; IF-THEN-ELSE constructions improved to Microsoft standard; MAX and MIN functions; a predefined constant pi (guess what?!); improved error handling, including the ability to read protect a Basic program using a Basic command; read protection for disk files; and a few other changes or improvements of somewhat lesser importance.

We now come to the goodies. Leaving the best for last (always a good policy), the next thing to look at is the formation of what TI calls subprograms, subroutines that can be called with a parameter list exactly like Fortran subroutines. Suppose we decide to have a subprogram called TEST which multiplies two numbers together, adds one of the numbers to the result and then prints it. This can be done in ordinary basic by saying:

```
 10 DEFFNA(X,Y)=X*Y+X
 20 INPUT A,B
 30 Z=FNA(A,B)
 40 PRINT Z
```

but this is not a subroutine and it never can be in ordinary Basic, since it will only work on the variables A and B. In TI Extended Basic this can be done with:

```
 10 INPUT A,B
 20 CALL TEST(A,B)
 30 GOTO 10
 40 END
 50 SUB TEST(X,Y)
 60 PRINT X*Y+X
```

```
70 SUBEND
```

This works, and if you don't understand the usefulness of this facility, just consider the fact that A or B could be replaced by *any* variable. The same result could be acilieved another way.

```
10 INPUT A,B
20 CALL TEST (A,B,C,)
30 PRINT C
40 GOTO 10
50 END
60 SUB TEST(X,Y,Z)
70 Z=X*Y+X
80 SUBEND
```

In this version, the variable Z can be used in the main program as well. A subprogram can be as long as you wish consistent with the memory available. As you can see, this is an *extremely* useful feature of the Basic.

Another of the more interesting features of the machine is its ability to speak using the plug-in speech synthesizer module. In the ordinary Basic, speech synthesis requires an extra ROM. With the new Basic the computer can be given a vocabulary of approximately 300 words which allow you to make limited phrases. The manual also mentions creating your own vocabulary but does not tell you how to do this. Nevertheless certain of my colleagues have managed to produce some unusual sentences.

The most interesting feature of the new Basic is the use it makes of the graphic capabilities of the TI 99/4. These are phenomenal, and it is surprising that the machine has not made better use of them up to now.

The single option I found most amazing is that once a graphics character called a "sprite" has been set up, it will continue to move in a specified direction on the screen while the computer does something else like calculating the square roots of the first 100 prime numbers. The "sprite" itself can be made up of either one or four characters which can be defined by you or be part of the standard character set of the computer. For instance.

```
10 CALL CLEAR
20 CALL SPRITE (#1,79,14,1,1,5,5)
30 GOTO 30
```

will clear the screen and set a magenta colored "0" moving diagonally across the screen very slowly. If the program is not interrupted, it will *never* stop! This may not seem terribly exciting, but consider the fact that the program is doing nothing to the character; it is only executing the loop 30 GOTO 30. Line 10 of this program clears the screen, line 20 sets up the figure as character 79 (an 0) with color 14 (magenta), starting point (1,1) (the top left corner of the screen), and velocity (5,5) (5 units in the x-direction and 5 units in the y-direction per unit time). As you can see, all the graphics routines are performed by subprograms built into the machine.

Up to 28 of these "sprites" can be created and used at one time. They can be defined in any shape you wish that can fit into an 8 by 8 format. This is done by creating a shape table in a string, which is easily done, and then using the CALL CHAR command to define the shape. I will include an example later. Once the character is defined, it can be used simply as a character or as a "sprite" as you wish.

After a "sprite" is created several things can be done to it. You can enlarge it, change its color, change its position, change its motion, discover if it has run into another "sprite" on the screen, find out where it is and find its distance from a point on the screen or from another "sprite." These are all done with simple CALLs. Everything is explained fully in the manual and it doesn't take long to create some pretty nifty graphics.

A sample program that draws 16 detailed skulls and crossbones on the screen, each about three centimeters across, and then moves them all about, changing screen color whenever one meets another, is given in Figure 1 to show how easy it can be. Incidentally, the background to a "sprite" can be made transparent, so when one crosses another you can see it pass over or under the other.

Line 10 clears the screen, then line 20 and line 30 set up the skull and crossbones shape. The next 16 lines set up the actual figures on the screen. Line 195 magnifies the figures so that they take up the space that 16 ordinary characters would. Then the last few lines check for a meeting between the figures and if there is one the screen color is switched to a random color and the sequence is continued until interrupted.

This is only a simple demonstration of the power of the graphics commands. It uses only one shape and ignores many of the built-in functions, but it serves to show what can be done.

With the addition of Extended Basic, the 99/4 still lacks some very useful features, like machine code, which is still practically unavailable, but it seems that TI has finally begun to exploit the potential of its personal computer. □

```
10 CALL CLEAR
      20 A$="E0E0E02F3F19191F1E0E0F1A3F27E0C00
         70707F4FC989F87B70F058FCE40703
      30 CALL CHAR(96,A$)
      40 CALL SPRITE(#1,96,1,1,1,0,10)
      50 CALL SPRITE(#2,96,2,1,1,0,-20)
      60 CALL SPRITE(#3,96,3,1,1,-10,0)
      70 CALL SPRITE(#4,96,4,1,1,20,0)
      80 CALL SPRITE(#5,96,5,1,1,2,2)
      90 CALL SPRITE(#6,96,6,1,1,20,-20)
      100 CALL SPRITE(#7,96,7,1.1,-30,30)
      110 CALL SPRITE(#8,96,8,1,1,-40,-40)
      120 CALL SPRITE(#9,96,9,1.1,5,10)
      130 CALL SPRITE(#10,96,10,1,1,30,15)
      140 CALL SPRITE(#11,96,11.1,1,4,-2)
      150 CALL SPRITE(#12,96,12,1,1,-10,20)
      160 CALL SPRITE(#13,96,13,1,1,-6,3)
      170 CALL SPRITE(#14,96,14.1.1.5,-10)
      180 CALL SPRITE(#15,96,15,1,1,-20,-40)
      190 CALL SPRITE(#16,96,16,1.1.-80,-40)
      195 CALL MAGNIFY(4)
      200 CALL COINC(ALL,DO)
      210 FOR X=1 TO 80::NEXT X
      220 IF DO=-1 THEN CALL SCREEN(INT(RND*16+1))
      230 GOTO 200
```

COLLEGE BOARDS

for TRS-80 PET, APPLE

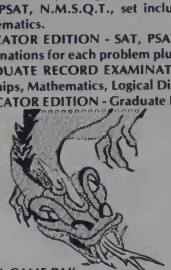
The best way to sharpen your skills for the College Boards is to work on actual examinations. Each of these program sets confronts the user with a virtually limitless series of questions and answers Each program is based on past exams and presents material of the same level of difficulty and in the same form as used in the College Board examination. Scoring is provided in accordance with the formula used by College Boards.

SAT, PSAT, N.M.S.Q.T., set includes 7 programs covering Vocabulary, Word Relationships, and Mathematics. Price $79.95

EDUCATOR EDITION - SAT, PSAT Includes all of the above programs plus detailed solutions and explainations for each problem plus drill exercises. SAT set includes 14 programs. $149.95

GRADUATE RECORD EXAMINATION set includes 10 programs covering Vocabulary, Word Relationships, Mathematics, Logical Diagrams, Analytical Reasoning. $139.95

EDUCATOR EDITION - Graduate Record Exam Set includes 20 programs. $199.95



KRELL GAME PAK

Incredible bargain, 15 unique and challenging games!!!

Hostage	**Primary Fight**
Prime Time	**Black Gold**
The Black Death	**Wordsworth**
Star Clipper	**Hard Scrabble**
Bulls & Bears	**Bible Quode**
Banzai	**Shakespeare Quode**
Banzai II	**Bill of Rights Quode**

Super Banzai *TRS-80 only, $39.95*

SWORD OF ZEDEK

Fight to overthrow Ra, The Master of Evil. In this incredible adventure game, you must confront a host of creatures, natural and supernatural. To liberate the Kingdom, alliances must be forged and treasures sought. Treachery, deceit and witchcraft must be faced in your struggles as you encounter wolves, dwarves, elves, dragons, bears, owls, orcs, giant bats, trolls, etc. Each of the 12 treasures will enhance your power, by making invisible, invulnable, more eloquent, more skillful in combat etc., etc., as you explore the realms of geography both on the surface and underground. Dungeons, temples, castles, mountains etc., are all a part of the fantastic world of Ra. Each game is unique in this spectacular and complex world of fantasy. $24.95

SUPER STAR BASEBALL

ALL TIME SUPER STAR BASEBALL Sample Lineup

B Ruth	T Williams
L Gehrig	J Foxx
J DiMaggio	H Greenberg
J Jackson	R Hornsby
G Sisler	H Wilson
S Musial	B Terry
T Cobb	M Mantle
W Mays	H Aaron
C Young-P	W Johnson-p

SUPER STAR BASEBALL Sample Lineup

D Parker	J Rice
W Stargell	H Aaron
W Mays	L Brock
P Rose	R Carew
O Cepeda	H Killebrew
C Yastrzemski	R Allen
W McCovey	R Leflore
R Jackson	R Zisk
G Brett	B Madlock
R Guidry-P	T Seaver-p

Performance is based on the interaction of actual batting and pitching data. Game can be played by one or two players with the computer acting as a second player when desired. Players select rosters and lineups and exercise strategic choices including hit and run, base stealing, pinch hitting, intentional walk, etc. Highly realistic, there are two versions, ALL TIME SUPER STAR BASEBALL and SUPER STAR BASEBALL featuring players of the current decade. Each includes about 50 players allowing nearly an infinite number of roster and lineup possibilities.

$14.95

TIME TRAVELER

The best of the adventure games. Confronts player with complex decision situations and the demand for real time action. Using the Time Machine, players must face a challenging series of enviornments that include; the Athens of Pericles, Imperial Rome, Nebuchadnezzar's Babylon, Ikhnaton's Egypt, Jerusalem at the time of the crucifixion, The Crusades, Machiavelli's Italy, the French Revolution, the American Revolution, and the English Civil War. Deal with Hitler's Third Reich, Vikings, etc. At the start of each game players may choose a level of difficulty... the more difficult, the greater the time pressure. To succeed you must build alliances and struggle with the ruling powers. Each game is unique. $24.95

*ALL PROGRAMS AVAILABLE FOR TRS-80, APPLE II & PET

*Programs for APPLE or TRS-80 are on disk or cassett, please specify.

All programs require 16K ● TRS-80 programs require LEVEL II BASIC ● APPLE programs require Applesoft BASIC

KRELL SOFTWARE

Send check or money order to
21 Milbrook Drive, Stony Brook, NY 11790
(516) 751-5139

CIRCLE 219 ON READER SERVICE CARD

Fantasy Games - Part 2

David Lubar

Still dazed from my first massive dose of fantasy games, I returned to the dungeons in search of the ultimate program. The path was strange and, at times, deadly, but there are treasures out there.

In the Beginning

Scott Adams was one of the first people to put major Adventures games into small computers, producing a series that has almost a cult following. His Adventures are text-oriented and accept one- or two-word commands such as "GO NORTH," "INVENTORY," or "KILL DRAGON." Each game has a specific motivation, ranging from greed to survival. In *Adventureland*, for instance, the object is to collect thirteen treasures hidden in a land abundant with magic and peril. In *Mission Impossible Adventure*, you have to save a nuclear reactor from terrorist sabotage while coping with an automated security system that doesn't like intruders. The attraction of such games rests in the ingenuity of the puzzles and problems encountered. Adventures make you think. Adams does well here, though, as in all games of this sort, some solutions won't work because the programmer didn't consider them. In a finite machine, this will always be the case.

Even when a solution doesn't work, the program should give an appropriate response. This, more than anything else, makes the difference between fun and frustration. The game shouldn't accept only the correct solution and ignore anything else. To give an example, let's say you have to break a window, and the required solution is to throw a stone idol at it. Suppose one of the items you are carrying is a violin. You might try playing a high note to shatter the window. In a poor game, the command "PLAY VIOLIN" would bring a response such as "WHAT?" In a good game, the response would be "NOTHING HAPPENS." In an excellent game, the reply would be something like "SORRY, THE NOTES PRODUCED AREN'T HIGH ENOUGH TO SHATTER THE WINDOW." This series of Adventures lies somewhere between good and excellent as far as handling improvised solutions. Some commands draw special responses, others draw stock replies. Not bad for games requiring between 16K and 24K.

The series begins with *Adventureland*, which includes extensive hints and clues for beginners. The second game, *Pirate Adventure*, also contains helpful hints, but it is a bit more difficult. As you move up the line, the games become even more difficult and devious, reaching a point where no hints are given.

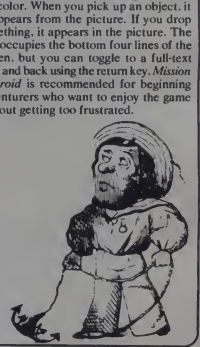
The games can be saved at any point, which is a good idea in view of their linear nature. You usually have to do a specific series of things to get to a particular point. Saving the game can save a lot of time if you get killed or lose an essential item.

Another highlight of these games is the inclusion of humor. Adams has spiced the Adventures with comic moments, somewhat easing the pain of the high fatality rate encountered during play. I would recommend *Adventureland* or *Pirate Adventure* for the beginner. Old pros will want the additional challenge of the later games, especially since some of them introduce time factors. In *The Count*, the player begins to get drowsy after a while, and faces the prospect of becoming an unwilling blood donor in his sleep. Anyone journeying through *Ghost Town* must worry about finding accomodations before the fall of night. And that's the least of his troubles.

The entire Adventure series is available for the Apple, TRS-80, and Sorcerer. Some of the earlier games are also available for the PET or CP/M systems. Prices start at $14.95 for a 16K TRS-80 or 32K Apple tape. Disks with three Adventures for 32K TRS-80 or 48K Apple are $39.95. Adventure games are available from **Sensational Software**, P.O. Box 789-M, Morristown, NJ 07960.

Picture This

Adventures with hi-res graphics are a specialty of **On-Line Systems**, 36575 Mudge Ranch Rd., Coarsegold, CA 93614, and they have three such games on the market. The programs will run on any Apple with 48K and one disk drive. *Mission Asteriod* ($19.95), labeled "Hi-Res Adventure Number 0," is designed as a beginner's game, though parts of it present a challenge to the pro. The object is to save the Earth from an approaching asteroid. You have to get a flight plan and other essential items, then fly to the asteroid, destroy it, and survive the destruction, all the while fighting against a time limit. The scenes are presented with excellent graphics in full color. When you pick up an object, it disappears from the picture. If you drop something, it appears in the picture. The text occupies the bottom four lines of the screen, but you can toggle to a full-text page and back using the return key. *Mission Asteroid* is recommended for beginning adventurers who want to enjoy the game without getting too frustrated.



ACORN ARCADE!

FOR TRS-80*

FAST, REAL-TIME ACTION WITH SOUND

PINBALL

By John Allen

Get your flipper fingers ready for action in this real-time machine language game.

Lots of sound and flashing graphics make this fast action game so much like the real thing that you'll have to remind yourself not to shake your TRS-80.* Choose from five playing speeds to match your skill—but be prepared for a lot of practice if you ever hope to master the fastest speed.

Can you beat your friends' scores? Will you avoid the dreaded "Bermuda Square?" Get PINBALL today and find out. Available for $14.95 on tape or $20.95 on disk.

BASKETBALL

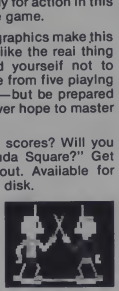
By John Allen

Fast machine language action game, with sound, from the author of the acclaimed "PINBALL"!

Try to keep up with the action and outscore your opponent in five minutes of one-on-one basketball. Steal the ball, duck around your opponent and slant toward the basket for a lay up! The graphics are based on a 3-dimensional depiction of a basketball court, and ball dribbling sounds add to the realism. Compete against a friend or your computer.

It's all there but the cheers—on tape for only $14.95, disk version for $20.95.

DUEL-N-DROIDS

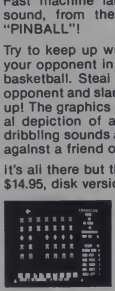


By Leo Christopherson

Your 'droid has already learned NIM, so now it's time to teach it how to wield a laser sword! For DUEL-N-DROIDS, a new type of animation and high-quality sound has been developed by Leo Christopherson, author of "Android NIM," "Dancing Demon" and other animations.

Your 'droid starts out as a lowly clown. You teach it how to use a laser sword by controlling its movements. After it attains the rank of "Grand Master," enter it in the tournament against the program. Entertainment for all ages!

Available for $14.95 on tape, $20.95 for disk.



INVADERS FROM SPACE

By Carl Miller

A new and faster machine language approach to this classic (and addictive) space game. As you play, the aliens drop bombs, move from side to side, and try to overrun your bases. All you have to do is shoot them down. It's easy—until they speed up their action!

You choose the speed, enemy bomb frequency and accuracy, and how many shots and bases you have. Unlike other games of this type, you can move your base and simultaneously fire at the invaders. Fun for all ages and skill levels, it has full sound effects for even more excitement.

Available for only $14.95 on tape or $20.95 on disk.

Available now from these and other fine Acorn dealers

AUTHORS & DEALERS WANTED

ADVENTURE INTERNATIONAL
Box 3435
Longwood, FL 32750

COMPUTERLAND/CLEVELAND
1286 SOM Center Rd.
Mayfield Hts., OH 44124
and
4579 Great Northern Blvd.
Cleveland, OH 44070

DIGIBYTE COMPUTER CENTER
31 East 31st St.
New York, NY 10016

E.B. GARCIA & ASSOCIATES
203 North Wabash
Chicago, IL 60601

H & E COMPUTRONICS
50 North Pascack
Spring Valley, NY 10977

HOBBY WORLD ELECTRONICS
10511 Business Center Dr.
North Ridge, CA 91324

THE PROGRAM STORE
4200 Wisconsin Ave
Washington, DC 20016
and
W. Bell Plaza
6600 Security Blvd
Baltimore, MD 21207

Acorn
Software Products, Inc.

634 North Carolina Avenue, S.E., Washington, D.C. 20003

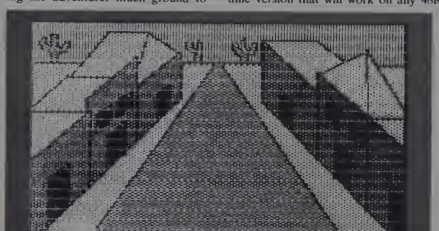
*TRS-80 is a trademark of Tandy Corp

CIRCLE 101 ON READER SERVICE CARD

Fantasy Games, continued...

Hi-Res Adventure Number 1, *Mystery Mansion* ($24.95), places you in a locked house with a group of people who are dropping like flies. One of the guests in the mansion is a killer. The murderer wants the hidden jewels, and he isn't about to let you stand in his way. In this game, the graphics are black-and-white line drawings, but still full of detail. *Mystery Mansion* makes a great party game, allowing a group to play pseudo-sleuth in the comfort of a living room. And it's nice to have other suggestions around when you come to the tricky parts.

The beauty and potential of this type of adventure is brought to a new high with *The Wizard and the Princess* ($32.95). I have mixed feelings about portions of it; nevertheless it was one of my favorites, and one of the most enjoyable games. It was also the most frustrating. While some players have been known to breeze through the game, others keep on running into trouble. Advanced adventurers shouldn't miss this challenge. You start in the town of Serenia, which borders the desert. The goal is to find and rescue an abducted princess. The first obstacle is finding the way across the desert. While the solution can be stumbled on through luck or careful thought, many people get hung up here. Once past the desert, there is a forest, an island, mountains, and a castle. Each major area contains a large collection of locations, giving the adventurer much ground to cover. Why did I say I had mixed feelings? On the good side are the graphics, the ingenuity of the program, and the internal logic in all the solutions. The bad side is tied in with the ingenuity. In a sense, this is a linear adventure. Without object A, you can't get object B. Without object B you can't get to a new location, and so on. If you get stuck at any point, you can't go on to new areas. True, that's part of the rules in this universe, but it can be frustrating, especially when you know there are undiscovered wonders beyond your reach. The other problem is that once the game is solved, there is nothing left to do with it. Since it is linear, you will have encountered every obstacle and seen every location after a successful play. On the other hand, finding the solutions and conquering the obstacles is a pleasure. For all the frustration encountered, the program made me think, and provided hours of fun.



The Wizard and the Princess begins in the town of Serenia.

Shades of Gygax

Many programs are designed to let the computer take the role of Dungeon Master. *Wizardry* from **Siro-Tech Software**, 6 Main St., Ogdensburg, NY 13669, does this better than any program I have seen. Written in Apple Pascal by Robert Woodhead and Andrew Greenberg, it will be sold in a run-time version that will work on any 48K Apple with DOS 3.3. The boot disk and initial scenario will cost $40; other scenarios will be available in the $20 to $30 range.

One or more can play, and each person can control several characters. Characters are produced at the training grounds, where characteristics are rolled. The character can be one of six types, including human, elf, and halfling. After the training grounds, the characters go to the Tavern. From here they have access to an inn where they can rest, a temple where dead members can be resurrected, and a trading post. At the trading post, characters can be equipped with whatever weapons they can afford. Certain characters can't use certain weapons. For example, Priests cannot use edged weapons. From the Tavern, the characters go to the Camp, then into the dungeon. The dungeon is displayed with three-dimensional graphics in the upper left of the screen. You walk through using keys for moving and turning. There are secret doors that only appear at certain times, and plenty of monsters. During each round of combat, you can fight, parry, use a spell, or run. The status of each character is displayed during combat. If a character is killed, there are two ways to get him back. You can go to the temple and pay a fee, or you can go to the training grounds and reroll him. If the entire party is killed, the characters are lost.

The program is full of nice features. Each character is stored with a password, so only his creator can bring him into the game. There is an inn where characters can rest and recover from their wounds. During play, characters age, and their performance is affected.

A group of hard-core D&D players tested the game and liked it very much, with a few reservations. The monsters encountered were much stronger on the first level than those in most dungeons. Also, it was not apparent how the characteristics affected play beyond determining the nature of the character.

All in all, *Wizardry* is an excellent program, and the possibility of future scenarios makes it a good investment for anyone in need of a Dungeon Master.

From Dungeons to Oceans

Synergistic Software, 5221 120th Ave. S.E., Bellevue, WA 98006 has three fantasy disks available for the Apple. *Doom Cavern* ($20) represents an excellent concept that is, unfortunately, limited by its own ambitious scope. The 48K Integer Basic program takes three characters into the dungeons of Hammardoom. As the player moves through this dungeon, a map is drawn in hi-res, and encounters occur. Many of the encounters bring in new programs, thus limiting the space on the disk and allowing for only one dungeon level. So then, the game is challenging, but too short. Solving the first level doesn't take that long. At the end, the author hinted he would be creating future levels. If so, the game could be outstanding. As it is, despite its brevity, the play was highly enjoyable. On the same disk is *Sorcerer's Challenge* in which two wizards duel. This is a strategy game with fantasy trappings, the object being to surround your opponent with spells, preventing him from moving.

The second disk contains *Wilderness Campaign* and *Dungeon Adventure*. These programs are also available on tape. *Dungeon Adventure* is a nice lo-res romp

Apple II sensational software

Creative Computing Software

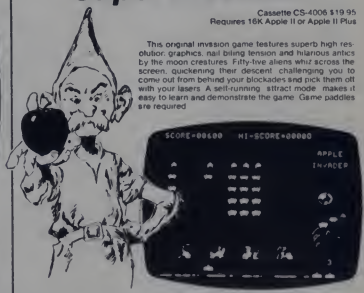
Haunted House

Cassette CS-4005
$11.95
Requires 16K

It's 6:00 pm and you have until midnight to find the secret passageway out of a large rambling HAUNTED HOUSE. During your search you'll encounter skeleton keys, charms, friendly ghosts, and evil spirits. Sound effects add to the eeriness. The layout changes in every game.

Super Invasion

Cassette CS-4006 $19.95
Requires 16K Apple II or Apple II Plus



This original invasion game features superb high resolution graphics, nail biting tension and hilarious antics by the moon creatures. Fifty-five aliens whiz across the screen, quickening their descent, challenging you to come out from behind your blockades and pick them off with your lasers. A self-running attract mode makes it easy to learn and demonstrate the game. Game paddles are required.

Outdoor Games

Cassette CS-4010 $14.95 — 4 Programs — Requires 16K Apple II or Apple II Plus

Forest Fire. Use chemical retardants and backfires to control raging forest fires.

Treasure Island I. Your map shows buried treasure but unfortunately you don't know where you are. Try to find the treasure while moving about and observing your surroundings. You have a 3-day supply of food and water. You may find useful objects (compass, weapons, a horse) but watch out for hazards (robot guards, pirates, caves, crocodiles, mountain lions and more).

Fishing Trip. Try to catch flounder and salmon while avoiding logs, sharks, bad weather and running out of fuel.

Treasure Island II. Same game except you have to use a metal detector to find the treasure.

Space War

Cassette CS-4009 $14.95
Requires 16K
Apple II or Apple II Plus

Take command in Space War. Select from five game modes, including reverse gravity, and the battle begins. Challenge your opponent with missile fire, force him to collide with the sun or to explode upon re-entry from hyperspace. Be wary. He may circle out of sight and re-appear on the opposite side of the galaxy. This is the classic MIT game redisigned especially for the Apple !

Outdoor Games and Haunted House

Disk 4504 $24.95
Requires 32K Apple II or Apple II Plus

This disk contains all five programs from cassettes CS-4005 and CS-4010

Super Invasion Space War

Disk CS-4508 $29.95
Requires 48K Apple II or Apple II Plus

Order Today

To order any of these software packages send payment plus $2.00 postage and handling per order to Creative Computing Morris Plains, NJ 07950. Visa, MasterCard and American Express orders may be called in toll-free.

Order today, at no risk. If you are not completely satisfied your money will be promptly and courteously refunded.

Creative Computing Software
Morris Plains, NJ 07950
Toll-free **800 631 8112**
In NJ 201 540-0445

Creative Computing Software

Apple is the registered trademark of Apple Computer Inc.

THE LEAST EXPENSIVE PROGRAMS YOU CAN BUY.

Up to 77 high-quality programs for TRS-80, only $10.95

NewBasic—expands '80 Basic

Now configure your Basic to do any or all of the following:

- Convert decimal to hex, and vice versa, provide character representation for each, or the hex-dec number of any character
- Blinking cursor
- Repeat key
- Audible key entry (each key makes a sound)
- directory command from Basic
- Disk load and disk run commands
- Graphic functions, including drawing blocks, lines, filling in blocks
- Lowercase driver
- RS232 driver (LPRINT-LLIST)
- Call function, hex-order number will execute subroutine
- Spooler and despooler
- Print toggle, LPRINT'S your video displays
- Find/locate a Basic command or string.

Modular Software Assoc, tape $19.95, disk $29.95

Level II Tapes

'Tiny' Pascal runs on any 16K Level II system, includes the programming structuring capabilities of full Pascal, but not data structuring

Able to compile Z-80 machine code, programs run about 5X faster than Level II Basic—graphics run right times faster! Requires use of T-Bug (or Tape 7) and ETASM

Tape 1, 24 basic, edu, game progs.	$10.95
Tape 2, 77 programs from Creative Computing book	$10.95
Commodore Basic Programs	$10.95
Tape 5, 24 basic, edu, game progs.	$10.95
Tape 7, 31 basic, edu, game progs.	$10.95
Tape 8, 40, Isc 4K bape applications	$10.95
Tape 9, 25 basic, edu, game progs	$10.95
Tape 10, income tax, checkg act	$10.95
People's Taxmate, fills out all forms	$10.95

PASPATCH

PasPatch, Tape 6P, makes Tandy tiny Pascal a powerful disk system!

Modular Software Assoc $15.95

SuperPIMx—People's Database

PIMS has been greatly speeded up and simplified, with machine-language sorts, key debounce, optional automatic lowercase (no keying, no hardware mod) on labels or reports. Up to 20 fields, limited by 255-character maximum per field. Easy to revise, add records, split or merge files, sum or average any fields. Customized for tape, tape & disk, Zoom, TCS Poor Man's Floppy, BiT, Stringy Floppy—all on one tape! As mailing labels program, easily manages 20,000 list. CIE does' Advanced labels module to come, $24.95, making system most powerful mailer available'

program (CIE) **$19.95 ($21.15 CA)**

book, details ease (CIE) $11.95 ($12.87 CA)

Tiny Payroll

We're takes it from Computer Programming for the Complete Idiot, thus a whole book of documentation! For all above systems

CIE $10.95 (CA $11.61)

Book, documents Tiny Payroll $5.95

Games for color TRS-80

Modular Software Assoc tape contains

- PONG80
- ENTRAP
- DEMOLISH (like Breakout)
- TRAFFIC (Grand Prix auto race)
- BETA TREK space game
- SHUTTLE (rocket ship game).

$19.95 ($20.55 CA)

Word Processing Newsletter

Want to really USE your computer? Then word processing is for you. Let your computer show you how much easier writing can be

Learn about the new $10 cps 'non-daisy' that at 10X daisy speed gives correspondence quality, at less than twice the cost. Too slow? The really fast guys are coming. How about 30-11x14 typeset-quality documents per minute? Maybe you could use the same printer as a copier

How about an inexpensive ($160) magnetic card reader writer that would let you input mail addresses, letter paragraph, even small programs?

Read about all this and more in Low Cost Word Processing, the only newsletter about word processing using your personal computer. Just $15 for 12 issues

All orders charge card, check or m.o.

Calif. residents add 6 pct tax. Dealer inq invited

Overseas, add $1.50 per tape postage

COMPUTER INFORMATION EXCHANGE
Box 159
San Luis Rey CA 92068

CIRCLE 124 ON READER SERVICE CARD

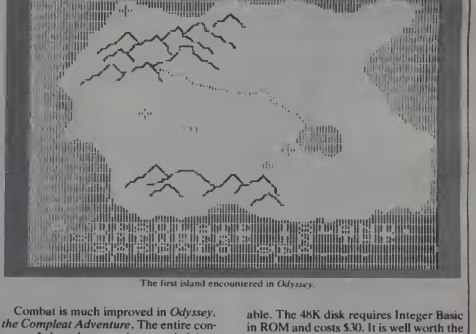
Fantasy Games, continued...

through four levels of dungeons, where the goal is to collect as much treasure as possible. Various beasts are encountered in these depths. The most dangerous are dragons that follow you and gulp down members of your party whenever they get hungry. *Wilderness Campaign* moves to a hi-res screen. Here, the goal is to gather enough troops to defeat the evil wizard. You wander the area, entering tombs and castles while encountering monsters and other hazards. There are towns where you can buy supplies and arms. The combat portion will interest those who enjoy role-playing games. On each round, the weapon value of the attacker and armor value of the defender is displayed, along with other points for special weapons, luck, and other factors. The problem with the combat is that the enemy is always reduced by half on each turn. This gets a bit tedious and predictable. The nice feature is that you control the "dice" using the spacebar. Despite the drawback in combat, the game is enjoyable, and each game is different.

Both programs come with Applesoft and Integer versions. *Wilderness Campaign* requires 48K for either tape ($17.50) or disk ($20). *Dungeon Adventure* requires 16K for tape ($15) and 32K for disk ($17.50). A 48K disk containing both programs costs $32.50.

alignment toward good or evil, and your alignment will affect the way others react to you. Wizards, for instance, will help those who are aligned with good and fight those aligned with evil. Warlocks behave in an opposite manner. This portion in itself is a fine game. But there is more.

Once you have a ship, you have to learn how to sail it, and venture to other islands in search of the orb. Changing winds, shifting currents, fog, and storms complicate matters for the adventurer at sea. A few unpleasant monsters have also been known to inhabit the deep. One of the islands contains an underground cave, thus bringing in another program. Some legends hold that the orb is beneath the ground. Others say it is in the sea. Those who know refuse to tell. After finding the orb, you must find the island of the evil usurper and defeat him. Here, some of the items previously found or purchased come into play. The initial portion takes the longest time, especially when you are new to the game and still struggling to survive this hostile land. Sailing also takes a fair amount of time; there are plenty of hazards to slow the adventurer or end his trip entirely. In comparison, the portion in the caves and on the last island are brief. Since the game ends by giving you your score, you have something to shoot for on the next run through. *Odyssey* is very good, highly enjoyable, and replay-



The first island encountered in *Odyssey*.

Combat is much improved in *Odyssey, the Compleat Adventure*. The entire concept of the adventure is expanded into four separate programs. You start out on an island, attempting to acquire enough money for a ship, and enough men to man it. During your romp through this hi-res region, you'll encounter sealed tombs, abandoned castles, wandering soldiers, wizards, warlocks, monsters, and scads of hazards. Your actions will affect your

able. The 48K disk requires Integer Basic in ROM and costs $30. It is well worth the price.

Next month: more romps through dungeons, heated battles, trips through time, and a look at a program that is definitely not for the squeamish. □

At Edu-Ware Services, we take pride in knowing who we are. Thus, we specialize in just those kinds of software we produce best: EDU-WARE, the science of learning. INTERACTIVE FANTASIES, journeys into the imagination. For two special kinds of minds..two distinct kinds of software.

Our thousands of satisfied customers have made a new look and new facilities possible. Yet behind them still lie Edu-Ware's high standards of service and quality.

new ALGEBRA 1, a tutorial in beginning algebra providing for wide variation in learner abilities, (DOS 3.3).

Compu-Spell
Arithmetic Skills
Compu-Math Fractions
Compu-Math Decimals
Compu-Read
Perception
Statistics

Network
Terrorist
Windfall
the Prisoner

Ask for EDU-WARE or INTERACTIVE FANTASIES from your local computer dealer.

EDU-WARE SERVICES, INC.
22222 Sherman Way, Suite 102
Canoga Park, CA 91303

EDU-WARE™

(213) 346-6783
Dealer Inquiries Welcome

CIRCLE 164 ON READER SERVICE CARD

Buyer's Guide to Small Business Computers

	Apple III	Digital Equipment Corp. Station 78	Dynabyte 5200	Heath H11-A	Honeywell Level 6 Model 23
CPU	6502A	LSI 81A	Z80A	K011-HA (LSI-11/2)	Honeywell CPS 93XX
Memory (standard)	96K	16K	64K	0	32K
Memory (maximum)	128K	16K	400K	56K	128K
I/O ports	5	—	3 standard (up to 19)	7	5-9
Floppy Disk Storage (max)	0.57M	2M	1.2M	0.5M	2M
Printer	optional	optional	optional	optional	optional
CRT	standard	optional	optional	optional	optional
Work Stations	1	—	8	1	16
Languages	Basic, Pascal, Pilot, Assembler, Fortran	Fortran, Basic	Cobol, Fortran, Basic, Assembler	Fortran, Basic (and any languages or software compatible with the DEC PDP-11/03)	Cobol, RPG, Fortran, Assembler
Price	$4240	$7,995	$7,000	$1995 (computer) $2595 (dual disk drives)	$4,800
Address	Apple Computer, Inc. 10260 Bandley Dr. Cupertino, CA 95014	Digital Equipment Corp. 129 Parker St. Maynard, MA 01754	Dynabyte Business Computers 115 Independence Dr. Menlo Park, CA 94025	Heath Co. Benton Harbor, MI 49022	Honeywell Information Systems, Inc. 200 Smith St. Waltham, MA 01821

EXCITING MAIL ORDER DISCOUNTS

apple II 16K computer

Disk II with Controller $535...without $446

$1099

Apple II 32K $1149

Apple II 48K $1199

DOS 3.3 with upgrade kit $54

APPLE II ACCESSORIES

Apple Joystick	647
ABT Numeric Input Keyboard	114
ALF Music Synthesizer	248
Brightpad Lightpen from Softape	32
CCS Prototyping Interface	139
CCS Thermal Printer Interface	159
Dan Paymter Lower Case Kit	59
D C Hayes Micromodem	325
Extender Board	24
Graphics Input Tablet	649
Intrek X 10 Remote Control System	239
Microsoft 16K RAM card	165
MHHR Sup R Term 80 Column Board	325
Microsoft Z 80 Soft Card	299
Novation Cat Modem	160
Sonic Mouse	195
Synachron 280/64 Word Vocabulary	215
SuperTalker Speech Synthesizer	239
Data Factory by Micro-Lab	139

WE SHIP FAST!

BVA 8" Disc Controller Card	399
Versa Writer Digital Drawing System	395
Adventure by Microsoft	627
Apple Bowl	14
Assembler/Disassembler	19
Asteroid Fields	19
Appleseed Graph & Plot System	59
Appleseed Mailing List System	44
Applesoft Utility Programs by Hayden	27
Applewriter Word Processor	59
Bill Budges Basic Game Album	20
Bill Budges Trilogy of Games	20
The Cashier Point Management System	160
CCA Data Management by Personal Software	84
CCA Data Management Users Manuals	20
Desktop Plan by Personal Software	79
Dow Jones Portfolio Evaluator	44
Forth II by Programma Software	49
Fortran for use with Language System	150
Fun w/ Language System	395
Sargon II Chess Game-cassette	27
Sargon II Chess Game-disk	32
Shell Games	27
Space Shuttle-cassette	27
Space Shuttle-disk	32
Sub Logic FS 1 Flight Simulator-cassette	20
Sub Logic FS 1 Flight Simulator-disk	24
Sylvan Apple-Ill 8080 Simulator	17
Visicalc by Personal Software	116

APPLE COMPUTER INTERFACE CARDS

Asynchronous Serial Interface #7710A	149
Applewriter II Firmware Card	160
CCS Arithmetic Processor Card #7810	229
CCS Asynchronous Serial Interface	179
Centronics Printer Interface Card	179
Apple Clock/Calendar Card by Mountain Hardware	229
Communications Card II DB25 Cable	179
Integer Basic Firmware Card	149
Parallel Printer Interface Card	149
Prometheus Hobby Card	32
Romplus Card with keyboard filter	169
Romplus Card without keyboard filter	159
Serial Interface Card Parallel I/O Assembled & Tested	179
Serial Interface Card	139
Symtec Light Pen Card	214

PRINTERS, MONITORS, DISCS

Paper Tiger 445G	799
Anadex DP9500A/P	999
Centronics without cable	819
Epson MX-80	call
NEC 8023	599
NEC Spinwriter #5510	2699
Paper-tiger 460G	1149
Microtek with Interface Card	695
Leading Edge 12" B&W	129
Sanyo 9" B&W	169
Lambda green screen	249
Dysan disks Ipkg 10S	49
Memorex Ipkg 10S	42
Verbatim Ipkg 10S	39

apple computer

Toll Free Order Line

1-800-854-2833

VISA

TO ORDER: Phone orders invited using Visa, Mastercard, or bank wire transfers. Visa & MC credit card service charge of 2%. Mail orders may send charge card number (include expiration date), cashiers check, money order or personal check (allow 10 business days for personal checks to clear). Please include phone number. Include 2% shipping, handling, and insurance ($5.00 minimum) in USA. Shipments within Calif. add 6% sales tax. Foreign orders include 1% handling-shipping freight collect. Foreign orders over $1000 allow 3 weeks sea/air and include $25 license fee. All equipment is in factory cartons with the manufacturers warranty. Equipment is subject to price change and availability.

MAIL TO: 1251 BROADWAY EL CAJON CA. 92021 (714) 579-0330

master charge

AUTHORIZED APPLE SALES & SERVICE

Computer Specialties

DIVISION OF CMI

The following chart lists a selection of machines hovering on that nebulous border between the inexpensive mini computer and the expensive, but powerful, microcomputer. While all those listed are suitable for business needs, not all satisfy every need, and some provide more power than required for certain functions. To expand on the categories listed: CPU refers to the Central Processing Unit of the computer. Memory includes both ROM and RAM. The I/O ports allow for the addition of peripherals such as a modem, printer, or card reader (if available). Maximum disk storage is a factor of the storage per disk times the total number of drives allowable. The chart also specifies whether printer and CRT (video display) are standard or optional. Work stations refers to the number of terminals that can access the computer at the same time. Prices are subject to change.

	IBM 5110	OSI C3-A	Technico SS16	Texas Instruments DS 990	TRS-80 Model II	Wang 2200 SVP
	IBM 5110 (8 bit)	6502A, Z80 and 6800	9900 (1b bit)	TI TMS-9900 (1b bit)	Z80A	Wang 2200 SVP
	16K	48K	96K	64K	64K	32K
	64K	48K	96K	64K	64K	64K
	2	1 standard (up to 16)	2	2	3	—
	4.8 M	1M	2M	4.6M	2M	2M
	optional	optional	standard	no information	optional	optional
	standard	optional	standard	standard	standard	optional
	—	1	2	1	1	1
	Basic, APL	Basic, Pascal, Fortran, Cobol, Asembler	Fortran, Basic, Assembler, Pascal	Cobol, RPG, Fortran, Basic, Pascal	Basic, Assembler, Fortran	Basic
	$8,475	$5995	$8,999	$9,450	$3899	$3,000
	IBM Corp. P.O. Box 2150 Atlanta, GA 30301	Ohio Scientific 1333 S. Chillicothe Rd. Aurora, OH 44202	Technico Inc. 9057 Red Branch Rd. Columbia, MD 21045	Texas Instruments Inc. P.O. Box 290 Austin, TX 78769	Tandy Corp. One Tandy Center Fort Worth, TX 76102	Wang Laboratories One Industrial Ave. Lowell, MA 01851

Programmers...

get the most out of your efforts!

If you've got a new program, SubLOGIC has got the marketing skills to help your work pay off.

We've propelled the FS1 Flight Simulator right to the top, and frankly we believe we can optimize the returns on your programming too.

If you've developed a program that provides entertainment, education, or management, then put its documentation into neat form and contact us. We don't just include your program as part of a long list. We'll help you define your product, price it, and promote it.

For a refreshing and honest appraisal of your program, get in touch with Steve Wilson, Administrative Aide in Marketing at SubLOGIC. Let's connect and maximize your potential. Write or call:

subLOGIC
Communications Corp.
713 Edgebrook Drive / Champaign IL 61820
(217) 351-0837

Mailroom

c/o Joe Kasser

Mailroom, from the Software Works, consists of a mailing list package designed to run on any system using a Northstar Floppy Disk Controller card, two drives, 32K of RAM and a printer. It is written in Basic.

Capabilities

Names and addresses can be entered into a master list. The contents of the list can be updated, edited and sorted. The list may be sorted in zip-code order or in alphabetical order. Names are keyed using a "Soundex" coding algorithm, which tends to show up misspelled and similar sounding names when searching the list for a particular entry.

The following features are contained within the package:

BUNDLE prints a bundling list which complies with the USPS requirements for the presorted first class mail discount.

COPY is used to copy entire or selected items from one list to another.

DELETE deletes entries that were flagged for deletion by the EDIT, FIND or ZIPFIND commands

DESELECT deactivates the SELECT process

EDIT permits the user to modify any field (except the sort key) in an address record

ENTER is used to enter a new address into the current mailing list

EXPLAIN provides a three-line synopsis of each of the system commands

FIND searches for and displays all entries having a Soundex code that matches the requested name

FIX insures proper file order if user-written software has scrambled the file

HELP lists command choices

LABELS prints labels in ascending-zip-code order

LIST lists the contents of a file in ascending-sort-key order

NEWLIST sets up a new list file and its associated pointer files

PARCEL calculates parcel post rates

SELECT sets up entries for listing, copying or label printing

STATUS shows the capacity and utilization level of current file

ZIPFIND same as EDIT, but by zip code

ZIPLIST lists the file in ascending-zip-code order

Customization is easy, and the documentation is easily read by users as well as programmers.

Other commands exist for manually initiating merging and sorting processes, for customizing the screen control characters, and for directing the output to either the console or the printer. This multiplicity of features is implemented by overlaying programs in memory using the CHAIN feature in Northstar Basic.

The software package computes the state from the zip code which is stored as a number. The package is thus not ideal for foreign postal codes which include letters, although a suggestion is made as to how to enter foreign addresses. The sort-by-zip-code features are then not utilized for non-U.S.A. addresses.

Documentation

The documentation is very good. The operation of each of the commands is explained in detail. Each of the commands is listed in alphabetical order and an index is present to facilitate the finding of any of them. A simple "plug in the disk and do something" process is outlined for first-time users who have to get the system up and running at once.

The manual is attractive and is printed on good quality paper. It describes the contents of the data files so that custom software can be added to process the information in the list.

One drawback to the documentation is what it omits. Most of the programs (commands) in the package use identical functions; the documentation, however, does not describe the identity of the variables used in these "standard" blocks. Nor does it show how these blocks could be used as a "standard subroutine library" in the development of custom software, except in one particular case.

Although the documentation states that 24K of memory is required, I've seen "out of memory" errors in a 24K system and have found a 32K system more useful for the sort operations.

Ease of Use

In practice, the software is easy to use and tends to flow smoothly. An index or menu is available if desired, and all commands are selected by name. My main objection is having the name of the list stored in a control file. Working with several lists, I tend to forget to change disks, and sometimes end up accessing the wrong list. The software does not have any way to identify the name of the list without reverting to Basic and requesting "PRINT Z$." The system is best used with

Joe Kasser, 11532 Stewart Land, Silver Spring, MD 20904.

the commands on one disk and the list(s) on another. Using a double-density system it is possible to put the list and the commonly used (EDIT, ENTER and LIST) commands all on one disk and use a one-drive system.

Users of the package need have no knowledge of Basic as long as they don't bomb the system.

Error Handling

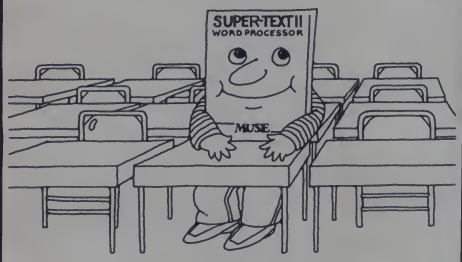
Error handling is nonexistent. Any error will return program execution to Basic. The documentation does state that if an error occurs, a "RUN 10 000" should be entered. It would have been easy to include the error trapping in the program, and even give the user a chance to close the disk door, insert the disk or even retype the entry.

Summary

Mailroom does require a working knowledge of Basic. Customization is easy, and the documentation is easily read by users as well as programmers. It is not that easy to bomb, but when it does, a knowledge of Basic is a must to determine the cause, which may be as simple as having the wrong disk in a drive. All in all, however, it is a good package and well worth the $99.95 purchase price.

The Software Works, Inc., P.O. Box 4386, Mountain View, CA 94040. □

Super-Text... In A Class By Itself.



Ease of use and a combination of powerful advanced features put Super-Text in a class by itself. The basics of text editing are easily learned within minutes. Yet the advanced features will meet your expanding word processing requirements far into the future.

Super-Text is unequalled by word processing systems costing many thousands of dollars more. Add the Form Letter Module and Address Book Mailing List for the ultimate in professional word processing.

Ask for a demonstration at your local computer store or write for specifications and the name of your nearest Muse retailer. Now that you're ready for word processing, think Super-Text.

available at your local computer store

MUSE SOFTWARE™

330 N. CHARLES STREET
BALTIMORE, MD. 21201
(301) 659-7212

CIRCLE 225 ON READER SERVICE CARD

CHOOSE...

Choose an Apple Desk

Ideal for an Apple computer system, our bi-level desk has a micro shelf to hold two Apple disk drives. Top level holds monitor, TV, or manuals. 42"w x 29½"d x 35"h.

Choose a Micro Desk

Our Designer Series desk with micro shelf is suitable for the North Star, Dynabyte, Vector Graphics, and Altos computers. A variety of sizes and colors available.

Choose a Mini Rack

Mini racks and mini micro racks have adjustable Retma rails, standard venting, and cable cut outs. Choose a stand alone bay or desk model. A custom rack is available for the Cromemco.

Choose a Printer Stand

The Universal printer stand fits:

Centronics 700's	Diablo 1600's & 2300's
Dec LA 34	T.I. 810 & 820
NEC Spinwriter	Okidata Slimline
Lear Siegler 300	Anadex 9500's

Delivery in days. 200 styles and colors in stock. DEALER INQUIRIES INVITED.

ELECTRONIC SYSTEMS FURNITURE COMPANY
17129 S. Kingsview Avenue
Carson, California 90746
Telephone: (213)538-9601

CIRCLE 218 ON READER SERVICE CARD

Lifeboat Introduces Financial Programming Language

Bob Callan

Profit and loss forecasts, commercial loan evaluations, cash flow management and product line planning are among the complex business applications available to users of Financial Planning Language (FPL) from Lifeboat Associates.

FPL was announced at a recent press conference held by Lifeboat Associates at the Playboy club in New York. The package was demonstrated on a TRS-80 Model II. A modified version of FPL, requiring less memory, is planned for the near future. While Lifeboat has no plans at present to adapt this package to the Apple, the new version may run on the Apple with CP/M and some additional software.

FPL, designed for use in a business environment, is said to compete with large computer and time-sharing system capabilities, at a fraction of the cost of either, $695. Behind this price stands the reputation of Lifeboat Associates, with a stated commitment to provide assistance and support for their customers. At the press conference, Roland Joffe, Lifeboat marketing director, said that FPL "offers speed, accessibility, and cost advantages readily apparent to exisiting time-sharing users." Dennis Brown, President of CP4 and the designer of FPL, compared this package to Infotab, Autotab, and Cyphertab. FPL has many of the features of these systems, he said, at a considerably lower cost. FPL is limited, however, to 2000 data cells, while Autotab has an almost unfimited number. The designer went on to say that an FPL system on a small business computer offers a higher degree of security and additional time to consider more and varied alternatives. Brown commented that many times these alternatives are not explored on time-sharing systems because of problems with speed and accessibility.

FPL is an expanded, computerized spread sheet, with some important differences.

Features in FPL allow profit and loss forecasts, commercial loan evaluations, pro forma statements, product line planning, budget planning and consolidation, product evaluation, cash flow management, real estate acquisition and development analysis, acquisition or merger analysis, marketing plans and performance, material and labor requirements, and capital investment analysis.

FPL is an expanded, computerized spread sheet, with some important differences. It accepts corrections or insertions and offers what-if capability, as well as operations with negative numbers. These allow decision-makers to update forecasts, explore alternatives, consolidate or recalculate the data of a model.

In addition to the conventional spread sheet that examines rows and columns, FPL supports arithmetic and logical operations on rows and columns (IF..

Figure 1. FPL Example Program Listing.

```
1010  ROWS                                1200  DATA
1020  GROSSS GROSS SALES                  1210  'GROSSS = 235840,228563,
1030  'RETURNS RETURNS & DISCOUNTS              233134
1040  NETSALES   NET SALES                1220  DEPREC=820,826,830
1050  COGS COST OF GOODS                  1230  'OTHINC=8050,0,23425
1060  GROSSP   GROSS PROFIT              1240  RULES
1070  SELLING OPERATING EXPENSES/         1250  MATHROW
        SELLING                           1260  RETURNS=.03*GROSSS
1080  GENERAL   GENERAL                   1270  NETSALES=GROSSS-RETURNS
1090  ADMIN   ADMINISTRATION              1280  COGS=.55*GROSSS
1100  DEPREC   DEPRECIATION               1290  GROSSP=NETSALES-COGS
1110  TOTOPEXP                            1300  SELLING=.23*NETSALES
1120  OPINC OPERATING INCOME              1310  GENERAL=.1*NETSALES
1130  OTHINC OTHER INCOME (EXPENSE)       1320  ADMIN=.05*NETSALES
1140  MIBT NET INCOME                     1330  TOTOPEXP=SELLING+ADMIN
1145  INCTAX INCOME TAX                         +GENERAL+DEPREC
1146  NETINC NET INCOME                   1340  OPINC=GROSSP-TOTOPEXP
1150  COLUMNS                             1350  NIBT=OPINC+OTHINC
1160  JAN JANUARY                         1360  INCTAX=.52*NIBT
1170  FEB FEBRUARY                        1370  NETINC=NIBT-INCTAX
1180  MAR MARCH                           1380  MATHCOL
1190  Q1 TOTAL/FIRST/QUARTER              1390  Q1=JAN+FEB+MAR
```

UNIVERSAL BUSINESS FORMS
Pro-Forma Income Statement
First Quarter, 1981

JANUARY 17, 1981

	JANUARY	FEBRUARY	MARCH	TOTAL FIRST QUARTER
GROSS SALES	235,840	228,563	233,134	697,537
RETURNS & DISCOUNTS	7,075	6,857	6,994	20,926
NET SALES	228,765	221,706	226,140	676,611
COST OF GOODS	129,712	125,710	128,224	383,645
GROSS PROFIT	99,053	95,997	97,916	292,966
OPERATING EXPENSES				
SELLING	52,616	50,992	52,012	155,621
GENERAL	22,877	22,171	22,614	67,661
ADMINISTRATION	11,438	11,085	11,307	33,831
DEPRECIATION	820	826	830	2,476
	87,751	85,074	86,763	259,588
OPERATING INCOME	11,302	10,922	11,153	33,377
OTHER INCOME (EXPENSE)	8,050	-	23,425	31,475
NET INCOME	19,352	10,922	34,578	64,852

Figure 2. FPL Example Report Formatting and Calculations.

THEN..ELSE). The model builder has complete control over the order of data processing. This is a major advantage over systems, which calculate each row completely. Model builders can establish question-and-answer dialogues so that clerical personnel may run the models, enter data as required and produce reports. User control is accomplished through the use of two menus. The Planning menu enables the user to initialize a worksheet, perform calculations, or produce reports. The Definition menu enables the user to redefine the entire worksheet, the data section only, or the rules section only.

There are several user statements that drive the analytical module:

SHOW—a list of particular rows or columns
DATA—to enter data using the data generation capabilities
ROW—to redefine a row
COLUMN—to redefine a column
CALCULATE—to enter the visible calculator subsystem
RULES—to apply the calculation rules to the matrix
SAVE—to save the matrix on a disk
MERGE—to merge the matrix with one already on the disk
.n—to force the display to n decimal places
Wn—to force a column to n spaces wide

The actual operation of the entire system is more complex than just this. Brown predicts it would take the average user two days to learn to use the system to its fullest capability. The manual is well written, and is about 100 pages long. As mentioned above, it can be tailored for use by clerical personnel entering the actual data.

The program listing and sample output shown in the figures are representative examples of the calculating and report generating ability of FPL.

FPL requires an 8080, Z80 or Z80A type computer, 64K CP/M system, with a total of 120K bytes of disk storage, Microsoft Basic version 5.2, and a CRT computer terminal with cursor addressing and clear screen. □

What do you want your computer and video player to do that they can't do now?

☐ A. Display videotape segments then automatically switch to computer text.

☐ B. Display multiple-choice options at each stage of the presentation, then, depending on the choice made, replay any portion of text and/or video, or move on to new material.

☐ C. Show any portion of the computer text and/or videotape (randomly accessed) depending on the pace and/or choices of the user.

☐ D. ALL OF THE ABOVE . . . and do it all on one screen.

If you checked D, contact us for more information on Cavri Interactive Video. We offer a reasonably priced, sophisticated system that links an Apple* or an RS-232 interfacing computer with a Sony or Panasonic VCR and TV screen — **with no modification**. Included are simple, straightforward instructions for writing your programs. Plus frame-accurate stops and switches with no accumulated error.

Write or call today and join the many companies, large and small, that are improving their audiovisual training and testing with the new technology pioneered by Cavri.

Training, of course, is only one application. Now you can catalogue anything — for example, a museum can videotape its paintings, sculptures, and artifacts, then show them by artist, subject, date, or any other grouping, regardless of the sequence in which they were recorded on the videotape. Tell us your application, and we can help by supplying the system and guidance on programming and videotape or videodisc production.

Cavri
interactive video

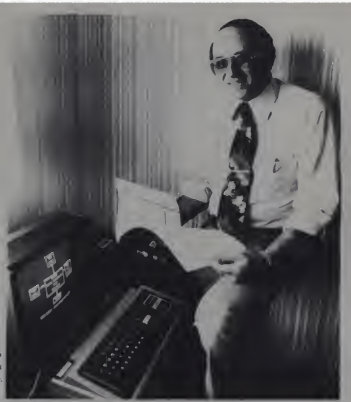
26 Trumbull Street, New Haven, CT 06511
(203) 562-4979

*TM — Apple Computer Co.

CIRCLE 132 ON READER SERVICE CARD

Level (II) Headed Business

Fred Blechman



The author poses with the staff of his Amway distributorship.

When microcomputers first appeared in kit form in 1975, I started watching for an under-$1000 ready-made computer. Although I had no technical knowledge of computers, and no programming experience, I assumed a microcomputer could do some routine number-oriented tasks that took time and energy in my Amway business. Also, I thought a computer would help me keep more accurate records in case of an IRS tax audit. So when, in late 1977, several "personal" computers were announced (Commodore PET, Radio Shack TRS-80 and Apple among them), all for less than $1000, I got serious about buying one.

After comparing ads describing the features of the PET, Apple and TRS-80, and asking a lot of questions, I decided to get the TRS-80. Although cost was not my primary yardstick, the TRS-80 was the least expensive complete system of the three I was considering. For $600 it included everything—computer, keyboard, video monitor, cassette recorder and power supply. All I had to do was plug it in and figure out how to operate it.

Since I was a novice at computing, I felt that Radio Shack, with their over-6000 outlets and orientation to beginners in electronics, would offer the best hardware and software support. I've never regretted my decision!

The TRS-80 Arrives

I ordered the minimum-memory-language Level I 4K RAM version of the TRS-80. It arrived in January of 1978 together with its most valuable "peripheral," the 233-page "User's Manual For Level I." Using this manual I found myself writing useful programs in Basic in just a few days. I was amazed at the versatility of Level I and it seemed as though I would never need more than a 4K memory.

However, my real intention was to use the TRS-80 in my business. I kept looking for packaged programs for invoicing, filing records, bookkeeping and letter-writing. Nothing significant was available in Level I. I considered paying someone else to write custom programs for me, but quickly found that could cost a small fortune. I had been operating my business *without* a computer for years, so it hardly made sense to spend a lot for programs I could obviously do without!

As time went on I wrote various programs in Level I to do *other* things. I kept track of my investments with a program I wrote.

I save over 15 hours a month using this program alone—with greater accuracy as an added dividend.

I used my mortgage amortization program to see the effect of different interest rates on monthly payments when we bought a new home. I wrote a program to display long distance phone charges in real time. I had to re-learn spherical trigonometry to write a program for aiming my "ham" radio beam-antenna to any spot on earth. All these programs were written in Level I Basic and worked within a 4K memory.

Looking For Programs

By this time Level II 16K was becoming the standard among TRS-80s, and much new software was available. I bought various programs for use in my Amway business, but found them either too complicated for my simple needs, or more trouble to use than the simple calculator I had been using. I had been running my business from home for years without employees or even an accountant. It wasn't difficult, but some of the paperwork was tedious. I was convinced my TRS-80 could help, if I could only find the right programs.

The Amway Corporation's sales volume worldwide in fiscal 1980 exceeded $1.1 billion at retail value. All products are sold exclusively through over 500,000 distributorships that are organized and supplied by over 18,000 "Direct Distributors." I built my Direct Distributorship in seven months while I was an aerospace engineer, and "retired" from engineering over 11 years ago when my part-time business income exceed my full-time engineering income for two years in a row. I now spend about 15 hours a week operating the business and 50 hours a week playing with my "toys"!

Order Checking

As an Emerald Direct Distributor I have hundreds of Amway Product Distributors in my present group. Since they are spread out all over the country and most of them deal with their "sponsor," I work personally with only about 30 distributors. Most distributors make up an order once or twice a week and come to my warehouse to have it filled. A full-page order has mixed quantities of up to 21 items, with five numbers associated with each item. The stock number defines the item and the four other numbers are related to bonus percentage, bonus dollars, cost and sales tax.

Fred Blechman, 7217 Bernadine Ave., Canoga Park, CA 91307.

mail this card today

☐ **YES,** please send me my FREE Heathkit Catalog of easy-and-fun-to-build electronic kits. I am not receiving your catalogs now, and I certainly would like to get them regularly.

FREE HEATHKIT CATALOG

name _____
(Please Print)

address _____

city _____

state _____ **zip** _____

CREATIVE COMPUTING

355-779

Free
HEATHKIT
CATALOG

PLACE STAMP HERE
Post Office
will not deliver
mail without
postage

Heath Company
Benton Harbor, MI 49022

Here's the easy way to write your own programs.

Heathkit Self-Study Courses give you a complete command of computer language, so you can write the programs that do your specific tasks. Choose from four programming languages.

Easy, step-by-step learning
You learn at your own pace, performing exercises on your computer and following a clearly written and illustrated text. Tests at the end of each unit assure your understanding before proceeding to the next unit. In most courses your reading is reinforced by cassette tapes, so you *see and hear*, for more thorough learning.

Hands-on programming exercises
You learn by doing, not just reading. Special exercises guide you through the steps of designing and writing your own programs for your computer. Upon completion of the courses you'll be able to tailor existing programs to your specific needs, or write your own original programs from scratch.

Recommended for college credit
Many Heathkit Courses are now recommended for college credit by the American Council on Education. If you can't go back to college, now you can bring college home to you.

Free Heathkit Catalog
Details and prices on the complete line of Heathkit Self-Study Courses on computer and electronics subjects are in the new, free Heathkit Catalog. Send for yours today or pick one up at your nearby Heathkit Electronic Center.

FOUR HEATHKIT PROGRAMMING COURSES
BASIC*: easiest-to-learn, hobbyist's language
PASCAL*: sophisticated, easy-to-use language
COBOL*: the businessman's language
ASSEMBLY: very efficient, very precise language
Coming soon: FORTRAN* and Microsoft* BASIC*

Heathkit Catalog
Dept. [illegible]
Benton Harbor, MI 49022
355-774

In Canada, write Heath Co.
1480 Dundas Highway East
Mississauga, Ontario L4X 2R7

Visit your Heathkit Store
Heathkit products are displayed, sold and serviced at 60 Heathkit Electronic Centers in the U.S. and Canada. See your telephone white pages for locations in the U.S. Heathkit Electronic Centers are units of Veritechnology Electronics Corporation.

Heathkit®

CIRCLE 206 ON READER SERVICE CARD

ED-159

Dragon Fire™

Is untold wealth worth the risk?

Dragon Fire™ is a trademark of Level 10. Apple™ is a trademark of Apple Computer, Inc.

Salmadon is no ordinary creature. Fables describe him as a nightmare made flesh. His dungeon is ten (10) levels deep and filled with hideous creatures.

They dwell within the maze of caverns for only one reason: to keep you from reaching the Great Dragon and his wealth. There is no map. The levels and rooms seem to re-arrange themselves at will.

As you battle your way deeper into the dungeons you find keys to the Great Dragon's lair. But which one is the magic key?

Remember you cannot take the wealth from Salmadon's lair without slaying him, and you cannot slay the great dragon without one of the right keys.

Dragon Fire is an intricate strategy adventure with 170 monsters guarding over 150 different treasures.

The random generation of the rooms and mazes makes each game unique. It can be played on a color or black and white monitor. It includes sound, hi-res graphics and a "save the adventure" feature.

Dragon Fire is written in Integer Basic for the Apple II and Apple II Plus with 1 disk drive and 48K RAM. Contact your local computer store hobby store or contact Level 10, a subsidiary of Daikin5 Corporation, Post Office Box 21187, Denver Colorado 80221.

LEVEL 10™

A subsidiary of Daikin5 Corporation.

CIRCLE 122 ON READER SERVICE CARD

Verifying an order is time consuming. You must first locate the stock number in the price list among over 600 items in six major business categories. Then each of the four numbers associated with that stock number must be multiplied by the quantity. At the end of the order you total all four columns, add sales tax and handling—and then try to remember to *deduct* sales tax for a few non-taxable items.

While this sounds like an imposing task, it's not a problem for the small distributor who only does this once or twice a week. However, for a direct Distributor, checking 50 or more of these orders each week can be a real drag!

I set about designing a program to do order checking, but executing my original program was more work than using a hand calculator! I found 4K Level I Basic simply had too many limitations, so I moved up to 16K Level II. I also added, later on, an Exatron Stringy/Floppy tape unit that saves and loads programs 14 times faster than cassette tapes, and an Okidata Microline 80 printer. My total system cost, at today's prices, is under $1500, and I now use it for many business functions.

It took a few months to really get the hang of Level II and the greatly increased capacity for useful work with a 16K memory—but it was worth the effort. Last year I wrote an Order Verification program that finds the stock number of any of 270 products held in memory, in less than 1 second. It multiplies the four associated numbers by the quantity and displays the results, line-by-line, on the screen. At the end of the order all totals are displayed, with the non-taxables automatically deducted.

I use my printer to generate weekly orders to the Amway Regional Distribution Center. A full-page, 21-line order now takes less than two minutes to generate or verify, as opposed to about 20 minutes by hand. I save 15 hours a month using this program alone—with greater accuracy as an added dividend.

Distributor Records

Having "conquered" the price list, I turned my attention to my distributor files. With hundreds of distributors scattered throughout various subgroups under my personally-sponsored distributors, it was a challenge to generate a complete "family tree" of my entire distributor network using just the file cards or Amway's listing. (Amway's list only shows the immediate sponsor.) So I wrote my Distributor Records program that allows me to identify all the distributors under my group leaders, or sponsored by any distributor. Also, Amway requires submission of an "Intent To Continue" form each year to maintain distributor status, and my program indicates those who have not yet done this by putting an asterisk after their names. I can now print out a list of all distributors in any group for the group leader, together with the "renewal" status. This program takes about 15 minutes a month to update, and another 15 minutes to print-out. This is a task I never did at all before, since it was too much effort without the computer.

```
NAME:SMITH    STATE:CA    ADA #:6579    MONTH:FEB 1981
UPLINE DIRECT:JONES       HIS NUMBER:0952

  DISTRIBUTOR'S NAME    BONUS %        BV          BONUS
DIXON                       15     1,835.17       275.28
ALLEN                        9       726.30        65.37
      DAVIS                  3       126.15         3.78
JOHNSON                     12     1,215.37       145.84
      BECKER                 3       180.25         5.41
      SANDER                 6       351.30        21.08
      HESS                   0        75.17         0.00
NO BONUSES                   0       425.80         0.00
STEVENS                     18     3,008.15       541.47

TOTALS:                            7,943.66     1,058.23

LINE 3:PERSONAL RETAIL SALES          217.60
LINE 4:TOTAL BV PURCHASES           7,943.66
LINE 5:TOTAL BV SOLD                8,161.26
LINE 6:BONUS BRACKET       25 %
LINE 7:PERFORMANCE BONUS            2,040.32
LINE 8:BONUSES PAID OUT             1,058.23
LINE 9:BONUS GROSS PROFIT             982.09
LINE 10:RETAIL PROFIT                  65.28
LINE 10A:SERVICING FEES                78.35
LINE 11:3% DD BONUS                   628.20
LINE 12:TOTAL GROSS INCOME          1,753.92
```

Sample Run-Monthly Gross Profit (screen and printer output)

I used my computer to trace $43,000 of bank transfers that the IRS wanted to consider as income!

Bookkeeping

Bookkeeping is another annoying chore for anyone in a small business. (Larger businesses hire bookkeepers!) Furthermore, the clarity and detail of your income and expense records may save you a bundle in an IRS tax audit. For years I used a simple 12-column ledger book to record income and expenses. Income is easy—it's just a total of all retail and wholesale sales plus bonuses for the month. Expenses are another story, since they have to be shown in some detail on an IRS Schedule C on your tax return. I use a single line for each check or petty-cash expense, showing the date, check number, payee, and purpose of the check. The amount goes in Column 1. This amount is then listed again under one of eleven "expense category" columns. Each page is totalled, then pages are totalled for the month, and months totalled for the year. The annual totals for each column are then entered on the Schedule C. Simple, but a lot of writing and adding!

So I wrote a program to let the computer add all twelve columns at once. This Simplified Bookkeeping program has recently been superseded by my 12-Column Ledger Program. This new program actually does all the ledger posting and column totals on 8 1/2-inch wide paper using a standard 80-column printer. I also use this program for an income ledger, and to tabulate deductible household expenses. (since we operate a business from our home we qualify for many deductions not otherwise available).

IRS Audit Time

I went through an IRS audit early in 1980 and found that my business bookkeeping—using the 12-column ledger—was entirely adequate. I also used my computer to trace $43,000 of bank transfers that the IRS wanted to consider as income! (The IRS adds all your bank deposits and savings deposits and considers this your income, unless otherwise shown as non-taxable income such as transfers between accounts).

I wrote a Monthly Gross Profit Summary program to print out a report for Amway. This previously took about 20 minutes to fill-in using a calculator. My program does all the calculations, and takes only about five minutes for data entry.

Communication

Correspondence is not a big thing in the Amway business—mostly just quick notes to distributors and a monthly bulletin. I thought it would be nice to generate these on the computer, so I bought several text editor/word processor programs. They were either too slow or too complicated. I don't need global search, paragraph movement, line insertion, fancy formatting and all sorts of other amenities. The ones I tried either required learning a whole bunch of new commands, or operated so slowly that even my hunt-and-peck typing was too fast, and some typed characters were omitted. So I wrote my own Speed-Letter program in Basic, with only three commands to remember. It accepts characters as fast as I can type them into number lines that can be edited at anytime. It has automatic page spacing and numbering, left margin spacing, tape read/write and handles both upper and lower case.

Another personal means of communicating with my distributors is telephone. When I plan on making a lot of calls at once—to remind distributors of a monthly meeting or notify them of a special event—I use my Automatic Phone Dialer program. I can hold up to 500 names and phone numbers in memory and list all the names on the screen alphabetically. To make a call I type in the name. The TRS-80 finds the number in memory and uses a $3 Radio Shack relay to interface the phone line. It then dials the number and displays the elapsed time on the screen by the second. The phone number is stored for redial if the line is busy, and long-distance charges are calculated if the rates are entered.

What About Your Business?

All this makes it sound as if it would be hopeless for you to get your own computer and use it in your business unless you are willing to program it yourself. That may be true, depending on your business! If you are in real estate or insurance, various programs claim to be just what you're looking for. If you have a specific business, look for programs written by someone actually in that business.

Magazine ads in computer magazines and various software catalogs can be your guide to the programs. Don't get your computer system and then look for programs. It's wiser to find good programs for your specific use first, and then get the system that uses those programs. Don't plan on "translating" programs. While this is feasible in some cases, it might not be in yours.

Sample Run-Order Verification Program (screen and printer output)

QTY	C/E	#	PV	BV	COST	RETAIL
3	E	8023	13.80	23.40	21.90	27.75
2	E	4211	32.00	44.10	31.88	47.30
1	C	8221	44.40	60.00	43.50	64.50 N
2	C	0745	51.60	96.00	79.20	112.80
4	E	0005	8.60	15.00	12.56	17.80
1	E	KIT	29.40	47.61	65.00	65.00
1	E	TAPE	0.00	0.00	1.90	1.90
4	E	EADS	0.00	0.00	1.44	1.44
1	E	FOUND	2.95	4.55	3.56	5.15
1	C	8337	33.00	50.40	39.96	57.60
		TOTALS...	215.75	341.06	300.90	401.24 N
		6% SALES TAX....			$20.20	
		4% HANDLING.....			$12.04	
		GRAND TOTAL.....			$333.14	

In other words, define your needs, find and see demonstrations of actual programs to suit your needs, and then get the system that can run those programs. This searching is not easy, but neither is it easy to spend hundreds of hours learning programming, then writing programs and debugging them, only to find out someone who really knows what he's doing has already done it for a different computer!

If you are an Amway distributor (or know one) my programs for the TRS-80 (only $25 for a package of five programs) are already developed and in use by over 120 distributors around the world. Many users have no previous computer experience, but heard about my programs and then bought the TRS-80 to use them. Others tell me they tried writing their own programs and gave up. Why re-invent the wheel? Check with others in your business and see what they've turned up. Pioneering is a lot of fun, but very costly in time.

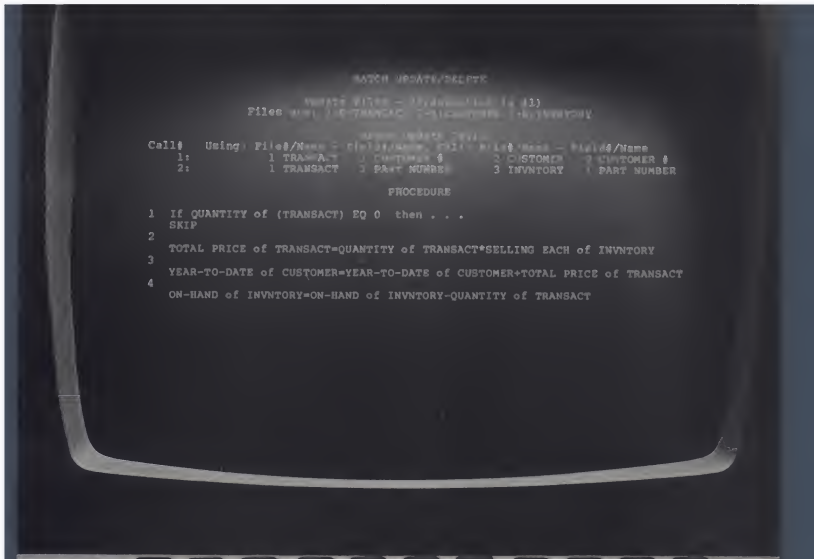
Caveat Emptor!

Be careful of "computer overkill": using the computer to do jobs better done *without* the computer, or doing jobs that don't need to be done at all! For example, I *don't* use my TRS-80 for inventory management. I find this is easily done by personal judgment. To do this on the computer would require elaborate input/output programming and entry into the computer of even the most insignificant transactions. Also, I would have to constantly reprogram ordering levels as my business volume varies. Who needs it? Neither do I use the computer for calculating the payment of monthly bonuses earned by many of my distributors. This is easily done by hand. To do this with my TRS-80 would require cross-linking data from several programs and entry of certain information only received monthly from Amway (warehouse orders, catalog orders, volume transfers, standing orders, and such). While this might be practical with a 48K dual-disk system and part-time operator, I don't need the extra work! All my programs run on a Level II TRS-80 with only 16K and no disks, using the KISS principle—Keep It Simple, Stupid!

Custom programming can be another problem. Be sure whoever you'll be paying to do this job has a good knowledge of your specific business and your particular operational methods. This also means you must be very specific in defining your needs. If you don't know what you really want the computer to do, then your time with the programmer could be a case of the "blind leading the blind."

Most of us have lived or operated our businesses many years without a computer, and could continue to do so. Properly utilized, your microcomputer can be a tremendous time and effort *saver*. Improperly used it can be a time, energy and psychic *sink*! □

"Their cheap threats don't bother me. The phone company tried that same approach."


BATCH UPDATE/DELETE
Call# Using: File#/Name - Field#/Name, Call# File#/Name - Field#/Name
1: 1 TRANSACT 3 PART NUMBER 2 CUSTOMER 2 CUSTOMER #
2: 1 TRANSACT 3 PART NUMBER 3 INVNTORY 1 PART NUMBER
PROCEDURE
1 If QUANTITY of (TRANSACT) EQ 0 then . . .
SKIP
2
TOTAL PRICE of TRANSACT=QUANTITY of TRANSACT*SELLING EACH of INVNTORY
3
YEAR-TO-DATE of CUSTOMER=YEAR-TO-DATE of CUSTOMER+TOTAL PRICE of TRANSACT
4
ON-HAND of INVNTORY=ON-HAND of INVNTORY-QUANTITY of TRANSACT

The Ultimate Application Development System

Nothing can compete with the brain when it comes to information storage capacity and speed of data entry and recall — but we're working at it.

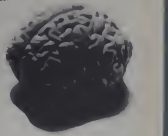
Our **SELECTOR-IV™** data base management system will let your microcomputer operate with the flexibility available (up to now) only on larger systems. You can create, maintain and report on files limited in size only by your *CP/M™ compatible operating system or disk storage capacity.

The basis of the power of **SELECTOR-IV™** is our unique method of cross-indexing the information in your files. You can immediately recall records by the contents of any piece of information required — from account numbers to ZIP codes to the date of your last audit. You can update records, individually or all at once. You can create new, uniquely, selected sub-files from existing ones (in the same or a different format), and perform computations in the process. You can define procedures to generate computed invoices, personalized letters, or gummed labels with the information coming from several files at once, and invoke them whenever needed. You can add new items to a record definition and change or delete them at will.

We've come a long way since we released the first information management system in microcomputers. We've listened to your suggestions and incorporated the best of them. We've built screen editing functions into the system which make operating the system as convenient as possible. We've had **SELECTOR-IV's™** documentation produced by our experts emphasizing its use for the novice, the applications developer, as well as, the retailer. Our applications specialists can provide you with a "turnkey" **SELECTOR-TV™** system customized for virtually any requirement.

With **SELECTOR-IV™** and a good word processor program, chances are you won't need any other software.

Look for SELECTOR-IV™ at your local computer retailer, or call:



MICRO•AP, INC.
7033 Village Pky.
Suite 206
Dublin, CA 94566
(415)828-6697

MICRO•AP

*CP/M is a registered trademark of Digital Research

CIRCLE 167 ON READER SERVICE CARD

AN OPEN LETTER

To: The Personal / Small Business Computer Industry

From: A Businessman

Subject: A Serious Problem in Your Industry

David Henderson

The personal/small business computer industry, in my opinion, is nearing a collision with credibility. If it does not change soon, there is the real chance the entire industry could be left quickly in shambles by lawsuits over false claims and misrepresentation of performance similar to litigation we have seen against some of the nation's computing giants.

There seem to be two general types of people now purchasing personal computers selling for less than $5,000: hobbyists who want to experiment and play with an expensive toy and businesspeople seeking a way to operate their businesses more efficiently. The rebellion will come from the latter group.

Advertising in the computer industry is largely misleading. Computer manufacturers want consumers to believe their machines are easy to operate with no prior computer background, software companies mislead consumers about what their programs will do and computer store salespeople bring both computers and software together and make just about any claim to make a sale.

First, these personal computers are not easy to operate if you have no prior computer training. Computers are not something you take home from the store, plug in and operate. It takes many, many hours to learn how to operate them.

Personal computers have the potential of being extremely useful tools in the home or small business.

I bought an Apple computer and a recommended "letter quality" printer, a Centronics model 737. The salesman told me the two would operate well together—that they were a popular combination. I had heard the same thing at other computer stores. What I discovered when I took it all home was different.

I bought the computer and printer mainly to do two things for my small business—to use as a word processor for correspondence and to maintain a mailing list using one disk drive.

I had told the salesman I wanted the ability to create "special" mailing lists quickly and even insert names from the mailing list at the top of form letters. He said the word processing and mailing list programs he was selling me would do all that. More about that later.

There was nothing in the instructions of the computer or printer to tell me how the two could communicate. It is a proportional character printer which takes electronic commands from the computer. But, in reality, it is as though the computer speaks French when the printer understands only Chinese.

The salesman at the computer store had no idea how to make it work so I called Apple Computer in California. The "hotline" expert told me flatly that he didn't know how to solve my problem of selecting print characters with the computer.

I sat there for a while looking at the blinking cursor and thinking about what the supposed "expert" had told me. Then, I decided to call someone higher up at Apple. Another call to California got me the product marketing manager, a helpful-sounding guy who told me that his company was using the same computer/printer combination in it's offices. I thought "Maybe now I'm getting close to some real answers about how to operate this thing," but I was wrong.

He told me that there was no way to change printer commands or characters once inside a word processing program. His company's popular computer could not do it.

I wondered aloud then how in the world I could use all the attractive options of my nice, $1,000 printer—elongated characters, underlining and a selection of characters—if the computer could not give the commands? How were the secretaries at the computer manufacturer achieving it? The answer (better sit down for this one) was that the secretaries cut and paste computer generated documents with different character types then Xerox a final copy.

I couldn't believe what I had just heard! I buy a computer and printer to save work then have to cut and paste to get the final word processing product!

The next long distance call was to the printer manufacturer, Centronics, in New England. Simply put, there was no one there who knew how to make my computer and their printer communicate. Their attitude was that they just make the printers. If you buy one, it is up to you to figure out how to make it work.

A word about the so-called "letter quality" matrix printers being sold with computers. To call such printers "letter quality" is not quite accurate.

Matrix printers create numbers, characters and letters with tiny dots striking the paper. Many people call it "computer print." It does not come close to the "letter quality" of even a $250 typewriter.

I was neglecting my business spending many hours trying to get a machine to work that everyone from manufacturer to salesman had told me was easy and would make my business run more efficiently.

I again called the store where I bought everything and was told that the answers to my question *must* be in the instruction books. They were not.

The instructions for the printer obviously were written by a rocket scientist to be understood only by other rocket scientists. The four books I got with the computer were general, lacking in specifics and seemed to assume I had extensive experience with computers.

I do not think I am alone in expressing some frustration. Not only could I not understand how to get my computer and printer to work for *me*, but experts in the industry couldn't either. Yet, they are selling this stuff to unsuspecting people, like me, leading us to believe that all you need to do is plug in a program and away you go.

I finally found a computer hobbyist who

David Henderson, 7287 S. Tamarac St., Englewood, CO 80112.

WE'RE HAVING A CREATIVITY EXPLOSION!

IS THE SKY THE LIMIT?

The opportunities are stellar — filled with all the professional challenge you might envision. Move up to ATARI, on the SAN FRANCISCO PENINSULA, where your design & development talents will fit right in with our momentum. Consider these newly created opportunities in our Coin-Op Division and our Consumer Division which includes Video Computer Systems (VCS) and Personal Computers (PCS), where we are the pacesetters in the industry:

MICROPROCESSOR PROGRAMMERS

Discover the excitement in the programming of coin-operated video games. In this incredible growth area, we need programmers with a BSCS or equivalent experience. Assembly language experience necessary; microprocessor experience and interest in games is desirable. (Refer to Job MP)

MICROPROCESSOR PROGRAMMER

You'll find unlimited avenues for your creativity with your involvement in our VCS cartridges, toys & games products. Assembly programming on mini or microprocessors, real-time control progremming, herdwere background end BSEE/CS or Math plus 1-3 years experience would make you an ideal candidate. (Refer to Job MP)

SR. SOFTWARE DEVELOPER

Step into our PCS Division and design & develop software in the areas of personal interest, entertainment, professional development — and more! Your in-depth experience of 5-10 years coupled with software design & development in real-time, interactive, graphics systems are key professional tools; Microprocessor background preferred. Writing and artistic talents plus systems analysis and specifications development background would be ideal. Degree or equiv. required. (Refer to Job SSD)

SR. COMMUNICATIONS SOFTWARE DEVELOPER

Help develop telecommunications systems of the future where thousands of ATARI Personal Computer users tie into international networks.

Your 4 or more years of experience in communications hardware and software on central-on terminal-systems will open our door for you. Software design & development skills are essential. Set your path for terrific career growth. (Refer to Job SCSD)

SR. MICROPROCESSOR PROGRAMMERS

Enjoy the satisfaction in developing programming for microprocessor controlled test equipment design in our Programmable Interactive Test Syatem for the Personal Computer line. You will have the opportunity to work with minimal supervision on long-range projects. BSEE/CS (or equivalent) preferred, with 3-5 years experience in microprocessor programming, including Assembly lenguege experience on 6502 (preferred) or 6800. (Refer to Job SMP)

SR. MICROPROCESSOR PROGRAMMER

If your expertise is on Data General equipment, with programming in DGL and ALGOL, you will enjoy working on development of progamming for our Data General controlled test equipment design. Minimum supervision on long-range projects. Bachelors degree or equivelent (BSEE/CS preferred); along with 3-5 yeers experience on Data Generel equipment preferred. (Refer to Job SMP)

SOFTWARE PRODUCT MANAGEMENT ENGINEERS

You will drew on all your talent and experience in developing business plans for aystem software and languages — including product specification, merchandising plans, manuels, and sales literature. You will alao have responsibility for schedule review and reporting. Ideally, you have a college degree (or equivalent) plus 6-10 years experience in one or more of the following: software product definition, project menegement in software development/ contract menegement of educetional products, business products, professional development, or systems software. You must have ability to communicate with e variety of departments involved in software development. (Refer to Job SPME)

ATARI provides you the ultimate State-of-the-Art environment complemented by exceptional salaries & benefits which include Company-paid Employee Life/Health/Disability/Dental Insurance, plus a Sabbatical Leave Policy which offers 7 weeks paid leave of absence after 7 years continuous service with ATARI. Please send your resume, including salary history, or contact our Employment Department, Mail Station OS, ATARI, INC., 1265 Borregas Ave., Sunnyvale, CA 94086. (408) 745-2030. We are an equal opportunity employer.

ATARI

A Warner Communications Company

Open Letter, continued...

I paid to write a program to get my printer characters changed. I had to *pay* someone outside the computer industry to get the products to work! Yet, I still cannot change the characters once inside a word processing program (remember cut and paste?)

Word Processing vs. Text Editing

Now, back to the software. The word processing program I bought is marketed by Apple Computer. It is called "Apple Writer, text processing system." If I listed what it will do and won't do, the "won'ts" would win. The program is very basic yet I bought it thinking that the computer manufacturer of all people would have a deluxe word processing program. I was wrong.

A sales representative for Apple said the Apple product is not a word processing program but rather a *text* processing system. The difference, he said, is that "text" editing is much simpler than "word" processing.

Yet, an unsuspecting customer has no way of knowing that he is about to become the victim of a semantics game when buying a computer program, especially when the salesman has called it a "word" processing program.

By the way, I'm using the word processing program to write this only because the format is straight-forward. I wanted to prove to you that I did figure out how to make it work even in its limited fashion. If I had to do something fancy, like columns of figures, it would be back to the old reliable Smith-Corona.

The mailing list, also marketed by the manufacturer of the computer, may be good. I never found out. Remember, I bought one disk drive because the salesman told me I only needed one for my business purposes. But the mailing list he sold me required *two* disk drives! He didn't know!

I returned the mailing list program, and the salesman recommended something called the CCA Data Management System. He said it would create my mailing list using one disk drive but he warned that the instructions were complicated. He was finally correct on one point. Remember those few guys back in high school who always wore white, long-sleeved shirts, never rolled-up their sleeves, had a plastic pocket protector with 17 pens and a slide rule and carried briefcases? Well, they have resurfaced and are writing data management systems.

The instructions said the program was "powerful" (they *all* say that) and much was left to my imagination. Time spent on imagination at this point is time spent away from business and that costs me money. Besides, I paid $100 for this thing and I want something that *works*!

However, I patiently waded through all the directions and created my mailing list. Yet, to create those "special lists" was a

Continued on page 45.

Reply From APPLE COMPUTER INC.

Phil Roybal
Manager, Communications Programs

As a rule, it is not the policy of Creative Computing to serve as a forum for dissatisfied customers seeking to avenge real or imagined wrongs by manufacturers. However, we decided to publish Mr. Henderson's letter, because it seems to typify some of the dissatisfactions about which readers write.

Because we know that there are (at least) two sides to every story and that for every dissatisfied customer there are hundreds of happy ones who don't take the time to write, we asked the manufacturers cited by Mr. Henderson to respond to his letter. At press time, only Apple Computer had sent a response. It follows.

I certainly sympathize with Mr. Henderson. To him as to many, a computer is what it does: word processor, sales forecaster, or whatever. And what it can do is determined by:

*Hardware (mainframe and peripherals), whose features set upper bounds on system capabilities. For example:
- Upper/lower case letters on printer; or
- Color capability on a video display.

*Software (text editor, forecaster, etc.), whose ability to use hardware features determines the actual system performance.

Here's the rub. Currently, about 180 companies market Apple software, and perhaps another 100 offer hardware accessories. Will any of that software fully exploit all possible accessories? No, not until hardware features become standardized and predictable. Let's draw an analogy.

Suppose your battered old TV is ready for replacement. It offered remote control of channel and sound, and you have the hand unit whose switches operated those features. The hand unit is still good, so you're going to keep it instead of paying for another with the new TV.

As your shiny, fresh set is installed, you discover that it offers not only remote control of channel and volume, but of color and brightness as well. You press the remote button and, sure enough, it works. But try as you might, you can't get that color adjustment to budge! Neither the Volume nor the Channel switch on your remote handset will affect it. Yet the console plainly offers remote control of these functions.

You assumed that just because the hardware (console) offered new features (remote color and brightness adjustment), your control "software" (remote handset) would be able to exploit them.

Were you misled? Clearly. But by whom? By a) your own lack of knowledge; b) a failure to ask questions (such as, "Could I see it work?"); and c) a dealer who erroneously presumed a certain level of customer understanding.

Isn't this Mr. Henderson's situation? He didn't try his software. He neither read nor asked about features important to him. And his dealer didn't make sure he understood his purchases. The result was an unhappy customer.

People buying unfamiliar equipment should take time to read the manufacturer's literature. Referring to Mr. Henderson's examples, Apple's catalog states that the mail list software (Apple Post) requires two disk drives. For the Apple Writer program, it explicitly defines the features of the software printer requirements. There is no mention of the Centronics 737 printer here, and proportional spacing capability is specifically disclaimed. That's because the program was not designed for use with a 737, and cannot exploit its special features. (Apparently Mr. Henderson was told this, but couldn't accept it.)

To guard against similar problems, we are adding an explanatory catalog section which tells prospects how to determine what hardware features are supported by our software. But we can only offer the information. We can't make people read it.

Of course, retailers should understand both products and customers' needs. And they should help users put those products to work. Manufacturers pay them to. But while dealers as a group are conscientious and knowledgeable, there is no guarantee that a particular store clerk will have the concern, insight, and knowledge to protect each customer completely.

So the ultimate responsibilty is the buyer's. He should learn a little about the products he buys. And at the very least should take time for a demonstration of those he is considering. As with any purchase, a little effort invested early can save a lot of grief later on.

Mr. Henderson's case is an unfortunate one, for he can never regain the time he has wasted. Let's hope that his painful experience, recounted here, can help readers avoid similar ones of their own. □

Turn your Apple into the world's most versatile personal computer.

The SoftCard™ Solution. SoftCard turns your Apple into two computers. A Z-80 and a 6502. By adding a Z-80 microprocessor and CP/M to your Apple, SoftCard turns your Apple into a CP/M based machine. That means you can access the single largest body of microcomputer software in existence. Two computers in one. And, the advantages of both.

Plug and go. The SoftCard system starts with a Z-80 based circuit card. Just plug it into any slot (except 0) of your Apple. No modifications required. SoftCard supports most of your Apple peripherals, and, in 6502-mode, your Apple is still your Apple.

CP/M for your Apple. You get CP/M on disk with the SoftCard package. It's a powerful and simple-to-use operating system. It supports more software than any other microcomputer operating system. And that's the key to the versatility of the SoftCard/Apple.

CIRCLE 168 ON READER SERVICE CARD

BASIC included. A powerful tool, BASIC-80 is included in the SoftCard package. Running under CP/M, ANSI Standard BASIC-80 is the most powerful microcomputer BASIC available. It includes extensive disk I/O statements, error trapping, integer variables, 16-digit precision, extensive EDIT commands and string functions, high and low-res Apple graphics, PRINT USING, CHAIN and COMMON, plus many additional commands. And, it's a BASIC you can compile with Microsoft's BASIC Compiler.

More languages. With SoftCard and CP/M, you can add Microsoft's ANSI Standard COBOL, and FORTRAN, or Basic Compiler and Assembly Language Development System. All, more powerful tools for your Apple.

Seeing is believing. See the SoftCard in operation at your Microsoft or Apple dealer. We think you'll agree that the SoftCard turns your Apple into the world's most versatile personal computer.

Complete information? It's at your dealer's now. Or, we'll send it to you and include a dealer list. Write us. Call us. Or, circle the reader service card number below.

SoftCard is a trademark of Microsoft. Apple II and Apple II Plus are registered trademarks of Apple Computer. Z-80 is a registered trademark of Zilog, Inc. CP/M is a registered trademark of Digital Research, Inc.

MICROSOFT
CONSUMER PRODUCTS

Microsoft Consumer Products, 400 108th Ave. N.E.,
Bellevue, WA 98004 (206) 454-1315

Meet the Tiger with a bigger bite.

Introducing the remarkable 132-column Paper Tiger™ 560. The first full-width matrix printer to give you fully formed characters for a low $1695.*

The new 560 features a staggered nine-wire ballistic type print head that overlaps dots in both horizontal and vertical planes. It bi-directionally prints up to 150 dense, text quality characters per second.

The 560 also features a reliable cartridge ribbon that lasts up to four times as long as spool and cassette ribbons, separate heavy-duty stepper motors to drive the print head and advance the paper, plus true tractor feed.

```
presents a breakthrough in matrix printin
ering the user excellent print quality wit
ce of a matrix printer.  Employing a uniq
red column" head manufactured by Integr
 creates high quality printouts by overla
```

Paper Tiger 560 Print Sample

And famous Paper Tiger performance comes with every new 560. Like fixed or proportionately spaced text, programmable tabbing and business forms control, automatic text justification, print formats to 220 columns, parallel and serial interfaces, self-diagnostics, and more. All inside the most compact printer of its kind.

Need more stripes? Dotplot,™ our high-resolution raster graphics package, is standard on every 560.

For data processing, word processing and small business applications, this is your Tiger. The business-sized Paper Tiger™ 560.

It's a Tiger you can count on.

Call TOLL FREE 800-258-1386 (In New Hampshire, Alaska and Hawaii, call 603-673-9100.) Or write: Integral Data Systems, Inc., Milford, NH 03055.

Paper Tiger 560

Integral Data Systems, Inc.

*Suggested U.S. retail price.

CIRCLE 207 ON READER SERVICE CARD

Open Letter, continued...

different story. Hours went by and I could not figure it out. How would I pull out names to make that "special" list I had been told by the salesman I could make? I called the salesman to hear him tell me again to read the instructions—he was busy with another customer—bye.

So, I called the program company in California. "You can't do it with that program" was the answer I got from their expert. I was told I needed to buy yet another program from someone else who had modified the original data management system to do what it was supposed to do in the first place. (Wonder if insurance would cover this computer junk if I backed over it with the Volvo?)

Next question to the data management company—what else will your program do besides a limited mailing list? Answer, "we don't like to discuss specifics but encourage customers to use their imagination." (Wonder if dropping it out the second story window would be covered?)

During one of many trips to computer stores in search of someone who knew how to work what he was selling, I ran into a stock broker friend who had purchased almost the same system I have. He, too, had been misled by computer and software claims. I think we have a lot of company out there.

My friend was talking about lawsuits against the giants of the computer industry by business who had been misled over computer/software performance claims.

We agreed that the same thing may be about to happen in the consumer-oriented/small business computer world.

Out of fairness, a brief word about many of the salespeople you will find in a computer store. Some of them actually do know how to insert a computer program into a disk drive and give a demonstration of something the computer will do. A typical example is the salesman who showed me how a $3,000 computer would automatically play "Mary Had A Little Lamb." I smiled politely and left the store thinking that my twelve-year old son can play that tune on a pushbutton telephone for free. Don't forget that a nationwide computer store chain pays beginning salespeople $150 a week.

Decisions to Be Made

The personal computer industry needs to make some decisions—either go after the hobbyist or the small business. At this point I do not believe both can be served. They certainly are not satisfying the latter.

Software manufacturers must tell the purchaser what their programs will and will not do. Many computer store owners have told me that they now stock only a few computer programs because they have been "burned" so many times. The majority of programs, they say, do not meet advertising claims. Sometimes, when a store owner wants to return such a program to get his money back, he finds the software company has gone out of business.

"A lot of guys are marketing software out of their basements," said a computer store owner. "Much of it doesn't work and we cannot afford to take chances." He said the lack of reliable software, other than games, is a critical problem.

"The personal computer industry is out of control because of demand," said a computer sales official. "Everyone is trying to cash-in as quickly as possible."

He also said that practical use software for all the computers now selling for under $5,000 is lagging about one year behind schedule. He suggested that businesspeople find a computer programmer to write the specific programs required. But that is expensive.

I am sure that one day, someone from the real world will market the programs I need, and then I can get my investment to pay for itself. Right now, however, a typewriter is just about as fast and far less expensive.

"We have a computer boom now. They're hot items," said an observer at a recent computer trade show in Denver, "but in reality, the $1,000 to $5,000 computers are still just toys."

The only advice I personally can offer to the consumer who is comtemplating the purchase of a computer is "let the buyer beware." □

Editorial Comment

We agree with Mr. Henderson that the problems he describes are important for the industry to consider. As more and more people become involved with computing, fewer and fewer of them will be familiar with its underlying electronic and logical principles.

Many of them, like Mr. Henderson, will feel that the responsibility for educating them rests with the manufacturers and dealers. We agree, in part, but feel that the consumer also has a responsibility. In the personal computing industry, as in any other, the informed consumer is his own and the industry's best friend.

Jeff Walden at Personal Software told us that the best advice he could offer to a prospective buyer of hardware or software was "ask for a demonstration." Only by seeing the equipment in action, he said, will the buyer be certain that the system will meet his requirements. We agree wholeheartedly, and suggest further that reading what owners and users of the equipment have to say is also important.

Most people are not expert auto mechanics, but how many of us would consider choosing a car solely on the basis of a salesman's pitch? The educated automobile buyer examines the manufacturer's literature and looks for evaluations of the cars under consideration in a publication such as *Road and Track or Consumer Reports*. After studying the manufacturer's specifications and comparing them with the reports of experts, he is ready to make an informed decision.

Purchasing a computer system should be no different. The manufacturer should be willing to provide detailed specifications and documentation, and the buyer should be willing to spend some time studying them.

Creative Computing and other personal computing magazines are the best source of evaluations of hardware and software. The buyer should look for an evaluation by a person whose application is similar to his own. A word processing program, for example, might receive high marks from a writer who uses it only for producing manuscripts, but be totally inadequate for office use.

Let the buyer beware? Yes, but let him also be informed. — EBS

"I'm sure you haven't tampered with it but it's odd that the computer should say you are the fairest machinist of them all!"

METAMORPHOSIS:

The Office of the Future Becomes the Office of the Present

George A. Miller

The office of the future is an easy thing to write about. It exists as a dream in the minds of many who know how it could look given simple projections of current technology as applied to office automation.

The office of the past is also easy to describe: desks, chairs, telephones, typewriters and filing cabinets. The office of the present, by contrast, is a jumbled mess. It is worth examining what the office of the present is, how it got that way, and how it will ever become the office of the future.

Before diving into a monologue of present day office automation, I wish first to define the word "office" and highlight its most important function. An office is a place where the administrative functions of a business are carried out. Offices are generally small, e.g., one floor of a building, and usually house people. A large organization may have hundreds of thousands of offices.

The main function of an office is *communication*: communication with customers, salesmen, other offices and among workers in the same office. Other functions include record-keeping and information retrieval. Computer hardware and software firms are interested in the office as a market for their products because there are over a million offices in potential need of word processors and electronic mail.

First, the Word Processor

The infection of word processors now being experienced by many offices is a curious phenomenon. Word processors have been around for four or five years but seem to have caught on only in the past year. A word processor is nothing more than a single application software package on a general purpose microcomputer system.

What is curious is that by deliberately restricting the function of the machine to one application, the computer becomes a word processor, thus finding entry into offices where it would otherwise be barred. We have witnessed a progression from typewriter to memory typewriter to word processor. Word processors are currently in the process of assuming communication and programming capabilities. In the future, we hope the screen in front of the user will lose its identification as part of a word processor and merely be the visual input port to the integrated office system.

If desks are built with clever pop-out screens and recessed keyboards, word processing and electronic mail may actually be fun and feel more naturally a part of everyday office life.

Before leaving the topic of word processors, I must mention that there is a subtle change in the organization of an office implied by the introduction of a word processor. No longer are typing skills so important. A word processor is very forgiving of mistakes and a user can see an entire page at a glance on the screen. The word processor thus becomes an ideal device for composition of letters, documents and ideas. More and more we shall see movement of word processors from the desks of secretaries onto the desks of managers and originators of documents (i.e., the thinkers and decision makers of an organization, clumsy-fingered though they may be).

Before word processors made the office scene, the most influential piece of office automation was the copier. Most of us cannot remember a world without Xerox machines. The introduction of copiers helped start the flood of paper which inundates offices today and sent the carbon paper industry into a tailspin from which we hope it will never recover. Copiers are slowly changing their colors, and one of the most colorful new entries in the market is the intelligent copier.

IBM was first in the marketplace with its 6670 laser printer, and Xerox, recently, introduced its 5700 laser printer. A host of other laser printers will surely follow. These machines can make a copy by creating an original document when fed a sequence of ASCII characters representing the text.

In other words, they are at once a convenience copier and a high-quality computer (non-impact) printer. This has staggering implications for the office of the present. In one device we find all paper-generating functions. The laser mechanism is also capable of drawing characters in many different fonts and sizes. The Xerox 5700 can even reproduce pre-stored signatures and company logos.

Intelligent copiers have many word processing functions built-in, including margin justification, page numbering and

George A. Miller, 2426 Bush St., San Francisco, CA 94115.

The Xerox 5700 laser printer.

document merging. In a sense, then intelligent copiers are competing rather than cooperating with word processors. They do make excellent companions to text processors, though: the cability of drawing orthogonal lines and boxes in addition to text allows them to produce forms on demand, thus relieving the office staff of the tasks related to printing and stockpiling the forms which make an office tick.

The new models of intelligent copiers should soon have raster (printing a line of dots [about 300 per inch] instead of characters) reading and printing. This will allow duplication of the facsimile function, computer graphic output function, and (possibly) document reading capability.

Paperless Office?

The notion of a "paperless office" often comes up in discussion of the "office of the future." The intelligent copier, of course, contradicts this notion.

Excessive use of paper is sure to be eliminated by computer storage of information and documents, however, I believe that the convenience and portability of books and papers will assure their existence for a long time. Radio and television, for example, had a great chance to eliminate books but only seemed to fuel the library fires.

Another role of the intelligent copier is that of publisher. Think how easily books may be written if a person has access to a word processor and a copier capable of printing characters in 12 different sizes and 200 different fonts. A person could "publish one book, twenty or a hundred without having to jump the expensive hurdle a trip to a publisher entails. IBM already has most of their manuals in machine-readable form and publishes them only when requested—the dawn of demand publishing.

Facsimile machines allow a person to transmit a picture or page of a document to a matching machine, miles away, over the telephone lines. Typically, these machines have been used to send photographs, documents,and signatures quickly across the country. While electronic mail and communicating word processors have bitten into this market, technological advances have also made facsimile machines smaller, faster and less expensive.

In a sense, then, intelligent copiers are competing rather than cooperating with word processors.

The switch from analog to digital recording and transmission of gray levels has been a major breakthrough in this area. Digital signals eliminate noise and are amenable to various compression techniques which minimize the amount of information which must be sent. Furthermore, digital transmission fits in nicely with established data networks and packet switching. It doesn't take too much imagination to see that a computer could receive or create these same signals.

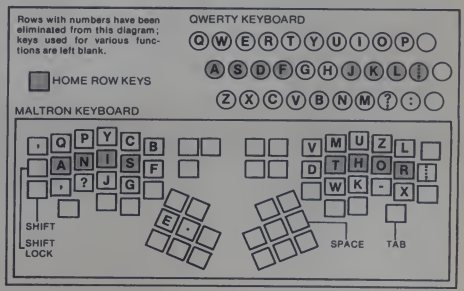
All of a sudden the facsimile machine becomes also a digital scan device and a graphics printer, and we see that development in this field is on a collision course with the evolution of intelligent copiers.

Whither the Telephone?

Another office device under siege by high technology is the lowly telephone. Many companies now offer private telephone exchanges for offices with from five to 1,000 telephones. Bells and whistles abound on these PBAX's. Calls can be rerouted, put on hold, conferenced, recorded, etc.

Two important trends in telephony are store-and-forward and digital voice. Most of us are too well aware of the ubiquitous telephone answering machine. This has made a big splash in the home market but has seen little use in the office. However, the game of telephone ping pong is a great plague in the office of the present. A few companies encourage their employees to use an answering machine at work, but the tradition of having a secretary take a message lingers.

The problem is that secretaries and receptionists are in too much of a hurry to leave a detailed message and most messages say simply "call back." An answering



Metamorphosis, continued...

machine is more effective in capturing useful information (if the caller is not put off) than a person since there is an implied sense of privacy. AT&T hints that telephone message store-and-foward is in the wings ready to be introduced to the public any day now. Other companies are not waiting but offering a PBAX capable of storing voice messages and waiting until the intended receiver requests them. This sort of system should go a long way in increasing the number of completed telephone calls.

The other important trend is toward digital voice. When voice digital encoding and decoding reaches the stage where the process can be put on a chip and cheaply put into the telepone handset, then digital telephone will join the rest of the office machines in being able to march along the same network lines as all this other automation.

In fact, voice is no different from written forms of office communication except for the input and output devices. The most important function of an office is communication, and telephones are an important part of that function. Digital voice allows telephones to be integrated into the automated office.

Terminal Development

Computer terminals are becoming commonplace in many offices. They are used to tap the company's accounting database, to access analytic tools from a timesharing firm and to keep abreast of the latest stock market or money market information. Unfortunately, the ergonomic aspects of terminal design have not kept pace with the technologic development: computer terminals still look similar to their ancestral teletype machines. The keyboard has grown to accomodate new characters and (unfortunately obscure function keys. Some terminals even boast keys such as PF14, DEL, SOH and FCNT6.

This sort of human engineering will never find favor in an office environment: an interactive computer terminal keyboard sould have as *few* keys as possible. A large green "YES" key, or a large red "NO" key, an amber "?" or "HELP" key are the types of keys we should see on the keyboard which will be welcomed into the office. In fact, if the keyboard is to find its way into the executive suite, this might be the time to switch from the old fashioned QWERTY layout invented in 1867 to a more scientifically designed arrangement such as the British Maltron system which has a more efficient arrangement of letter groups.

The computer terminal is also encumbered with a large Cathode Ray Tube which burns the eyes and hogs desk space. One reason that CRT's are so popular is that they are just stripped down TV sets and are cheap. What we need, however, are compact, low-powered, flat screens. Although the flat plasma display screen

The Toshiba LCD pocket television.

has been around for ten years or more, it really has not caught on—probably due to its high cost.

The technology which holds the most promise is the LCD display. LCD displays started out as four-digit screens on watches and have evolved to 20-character dot matrix displays on hand-held computers. It is hoped these displays will eventually grow to the 80 x 24 character screens used for most computer terminals, but the success of such a screen will probably be linked with the succes of using the same screen for ordinary TV reception.

The ideal computer terminal is one that measures 11" x 8-1/2" x 1/2" when folded. It unfolds to reveal a flat screen and a Maltron keyboard. It is battery-powered and contains a built-in modem, repertory dialer, NBS encryption/decryption chip, LPC digital voice analyser/synthesizer chip, speaker, microphone, 1 megabyte bubble memory, digital pager reception module and a removable micro cassette. Each key on the keyboard is actually a small LCD display which can be programmed to display the alphabet, calculator keys, APL, a calendar, word processing keys or even the QWERTY arrangement should the occasion arise. There will be only two jacks in the terminal: a telephone modular jack and an Ethernet information jack.

The ideal computer terminal will arrive on the office scene long before the ideal software support. There are many applications which hold promise for the beleaguered office of the present. Some word processing packages, for example, offer electric calendars. It is quite difficult to compete with the ease-of-use, portability and cost of a paper calendar, but the electronic calendar holds the promise of being an active agent rather than a passive information sink. Already, there are several calculators marketed which will accept appointments and alert the owner at the appropriate time and date.

Furthermore, communicating electronic calendars could be used to set meeting times for a group of people and reserve rooms or pieces of equipment. To be successful the communicating electronic calendar must be used by everyone in the office—a problem that may keep it from ever being accepted.

Another office function ripe for smoothing is the signature trail. Many requests must travel a long road of reviews and approvals before being accepted. Communicating word processors have helped by enabling the documents to be sped electronically from one approving officer to another. however, the primary document with the inked signatures must be carried manually from one person to the next. What is needed is an electronic signature. I am aware of only one attempt at incorporating the electronic signature into an office system and that is the amazingly advanced Officetalk system being developed at Xerox Parc.

Electronic Mail

Undoubtedly the most successful software office application to date has been electronic mail. Some companies have been using electronic mail for almost a decade and more will use it in the next few years as more public electronic mail systems appear. Electronic mail is a computer-based message switching system. Messages are delivered to recipients only at his request. (unlike telegrams or telephone calls which can interrupt).

Electronic mail can be used to send simple messages, memos, word processing documents, even phototypesetting codes to a publishing firm for fast production of pamphlets or newsletters. Furthermore, since electronic mail messages are, by definition, in computer readable form, the sender or intended receiver is often a computer application instead of another person. Electronic mail systems often have elaborate filing schemes which allow a person to retrieve quickly previous messages by date, author or subject matter.

Electronic mail has greatly improved communication within an office and between offices. Improved communication

Small Printers

Big Performers

OKIDATA MICROLINES

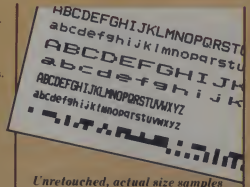
The Okidata Microline 80 printer set the standards for the home computer market. Now there are two new low cost Microlines for business use that have already won the praise of the most demanding OEMs—the Microline 82 and 83—setting new standards for performance, reliability and flexibility.

Using a tiny, seven-pin head that weighs less than four ounces, the Microline 82 and 83 produce sharp, crisp copy *and graphics* on plain paper, multipart forms. The unique head is driven bidirectionally by an elegantly simple mechanism at 80 cps in the Microline 82 and 120 cps in the 83. Short line seeking logic further boosts throughput by 80% over equivalent unidirectional printers.

The low mass, high performance Microline head is warranted for 200,000,000 characters.

OEM savings add up because there is no need to stock different models (and spares) for different customers. The Microline 82 and 83 include *both* RS232C serial and Centronics-compatible parallel interfaces as standard equipment. Both printers have friction platens that accept adjustable snap-on tractors and form controls that include vertical tab, top of form and a vertical format unit

Since 1972, Okidata has been building the best. There are thousands of Okidata printers in computer rooms throughout the world bearing nameplates of the top OEMs in the industry. The same standards of excellence have been applied to the low cost Microline Series—two motors, rugged cast aluminum base, *no* compromises. Call today for details. Representatives throughout the world.



Unretouched, actual size samples of Microline printing. Standard, double width and condensed characters and 64 block shapes for charts, diagrams and illustrations.

OKIDATA

Okidata Corporation
111 Gaither Drive
Mount Laurel, New Jersey 08054
609-235-2600

Okidata is a subsidiary of
Oki Electric Industry Company, Ltd.

CIRCLE 211 ON READER SERVICE CARD

ON-LINE systems

Presents

HI-RES SOCCER

HI-RES FOOTBALL

BY
Jay Sullivan & Ken Williams

Hi-Res Soccer is the only real-time action Soccer game available for your computer! All tackling, goal kicking, throwing, corner kicks etc., are shown in full Hi-Res Graphics.

- **Play against a friend or against the computer**
- **Fully animated players**
- **3 Levels of play**
- **8 players per team**
- **Real-time clock, realistic sound effects**
- **Hi-Res scoreboard**
- **Realistic Soccer play - both indoor and outdoor Soccer rules.**

Hi-Res Soccer runs on any 48K Apple II or II Plus, DOS 3.2 or 3.3. Available now for $29.95 on disk from your local computer store or you may order directly from us.

This is the football game you always knew the Apple was capable of, but no one could deliver—UNTIL NOW.

Skill and strategy are combined as you call the plays and control the players in this exciting real-time action game. You can run, pass, kick, sack the quarterback, or fake-out the defense—all in fully animated Hi-Res Graphics. Play against a human opponent or against the computer.

Hi-Res Football runs on any 48K Apple II or II Plus, DOS 3.2 or 3.3. Available now for $39.95 on disk from your local computer store or you may order directly from us.

To order direct, send the purchase price plus one dollar for shipping to:

ON-LINE SYSTEMS
36575 Mudge Ranch Rd. - Coarsegold, CA 93614 - 209-683-6858
Visa, Master Charge, C.O.D. or Checks Accepted.

CIRCLE 248 ON READER SERVICE CARD

is especially pronounced in geographically dispersed offices where the difference in time zones precludes real time communication.

Teleconferencing uses electronic mail for the communications vehicle, but is a higher type of communication. While electronic mail refers to one person sending a message to a computer to be held for another person, teleconferencing focuses upon a particular problem or topic. An electronic discussion is held between interested persons who are separated by time and distance. The goal is resolution of a problem or enlightenment on a topic under discussion. The computer acts as a master of ceremonies, notifying people of topics which may interest them, controlling entry into discussions and making a transcript of the conversation. (This is not to be confused with video teleconferencing used to cut down on air travel.)

Tying It Together

Automation may best be introduced to the office through the lowly desk. It is taken for granted that every office worker gets a desk. By building electronic equipment into a desk and selling an "electronic desk" rather than a bewildering assortment of telephones, calculators, word processors, typewriters, computer terminals and dictaphones to put on the desk, the vendor addresses the office furniture budget rather than the DP budget. DP departments often view the intrusion of computer gear into the office as a dangerous loosening of their strangle hold on the company's electronic processing. Furthermore, if desks are built with clever pop-out screens and recessed keyboards, word processing and electronic mail may actually be fun and feel more naturally a part of everyday office life.

We are beginning to see modular office cubicles with built-in lights, drawers, filing cabinets and closets. It is just a matter of time before they include electronic gadgetry as well.

Meanwhile, a serious problem faces the present office trying to install today's modern equipment: wiring all the pieces together. I see floors being ripped apart and sewn together as cables are laid to connect workstations of some word processor to the central processing unit. I see all sorts of modems and acoustic couplers on desks trying their valiant best to squeeze information over a copper line designed many years ago for analog voice transmission. Belatedly the industrial giants have realized that this is a serious problem.

Probably the most widely advertised solution is the Ethernet, a joint product of Xerox, Digital Equipment and Intel. Ethernet is similar in concept to power lines laid throughout a building with outlets placed conveniently every six feet or so. With Ethernet a coaxial cable is laid throughout an office building—also with convenient outlets. The Ethernet, however, transmits data, not power.

The network is local to the office and meant for communication between office devices. The network is passive and relies on the broadcast concept of communication where each message is headed by the address of the intended receiver device. All devices "hear" all messages which are sent, however, they read only those which are addressed to them. If two messages are broadcast at exactly the same time the senders recognize the condition, back off for a period of time and rebroadcast. The Ethernet specifies the bandwidth to be 10 megaband, which is plenty for most office data communications today, but probably insufficient for a large telephone system transmitting digital voice.

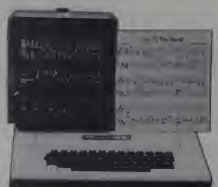
Whatever the winning specifications are, the concept behind the Ethernet is solid and the implementation of such networks will help to move the office of the present into the office of the future.

As the offices move into the future they will need to be "connected" into the network or the company's computer on a more continuous basis than we see today. Today, when a decision maker wants to access the company's database he often must turn the computer terminal on, dial a telephone number and go through a log-on procedure before he gets the information he wants. Local networking will provide the means for *all* office workers to be "plugged in" *all* the time. Furthermore recent advances in radio transmission are allowing paging devices to receive long messages and retain them. As satellite reception by a tiny portable device becomes feasible we can expect global coverage. Won't it be pleasant to know that your boss can contact you wherever you are, whenever he wants?

Won't it be pleasant to know that your boss can contact you wherever you are, whenever he wants?

In summary, the main function of an office is communication. In the office of the future, all office equipment will be able to communicate—with its owner as well as with other equipment. Every office worker will someday have a keyboard and screen or "window" into the communications net, and portable equipment will allow communication on the road and at home. Whether all this leads to a more pleasant, productive environment is for time to tell. □

The joy of music — without years of practice!



ALF offers the very finest in music hardware and software for the Apple® II. You can enter your own songs from sheet music and play them back very easily — our detailed manual shows you how, step by step. And there's a growing library of preprogrammed songs available too — now over 115 songs on 7 "albums", priced under $15 each. ALF's highly acclaimed music software has many features found on no other Apple music product — and no customer has ever reported a "bug" or error.

Whether you pick our exciting 9-voice MC1 music card at just $195, or our gourmet 3-voice MC16 card at $245, you'll get ALF's top-quality hardware that's famous for reliability and clean sound (we've been designing computer-controlled musical instruments since 1975).

So see your Apple dealer today, and be sure to specify ALF music cards for the best performance. When you've seen ALF's total music package, you'll know why some music cards are more equal than others!

Please mention this magazine when requesting information from:

A L F Products Inc.
1448 Estes Denver, CO 80215 (303) 234-0871

Apple is a trademark of Apple Computer Inc.

EAR TRAINING

Four programs (pitch discrimination, interval recognition, chord recognition, and scale recognition) for the ALF MC16 music card (described above) are available on disk (or cassette). Under $50 for the set, see your local Apple dealer.

For more information write

A L F Products Inc.
1448 Estes Denver, CO 80215
(303) 234-0871

Electronic Fantasy

Gregory Yob

We all know from Buck Rogers that wall-sized TV screens will happen someday; some of us even own the Sony or Advent projection TV systems already. Unfortunately, the resolution and lighting requirements for projection TVs leave a lot to be desired, and even a 2048 x 2048 pixel screen will not have the resolution that this page does.

I recently learned about a terminal-sized Liquid Crystal Display (LCD) and thought a bit about a wall-sized LCD with around 100 lines/inch resolution. A few long evenings of scribbling notes convinced me that the Very Large LCD (VLLCD, right?) will be feasible sometime five to ten years from now, and that a detailed article showing how the VLLCD might be made could help things along. I don't want to build one, but I could sure use one!

The first thing to do is dream about what the electronic blackboard (a nicer name for the VLLCD) can do. Then take a look at the features which are really desirable, and combine these in a preliminary design. Then comes the tun part: suggesting various bells and whistles for later versions of the blackboard.

The Fantasy

It is 1990, and my study is the almost-paperless office with a terminal-desk and the electronic blackboard (EB) on the far wall. (See Figure 1.) I sweep my viewing wand over the sheet of paper on my desk, and the image is stored in the desk's computer. Now I walk to the wall and point a pen-like device at the spot where the image is to be "posted." Alas, this obscures part of the Household Energy Report, so I point the pen at the wall again, and a menu appears. When I select the "drag" mode, the menu fades out and as the pen moves, the image moves as well. Pressing a button on the pen releases the image.

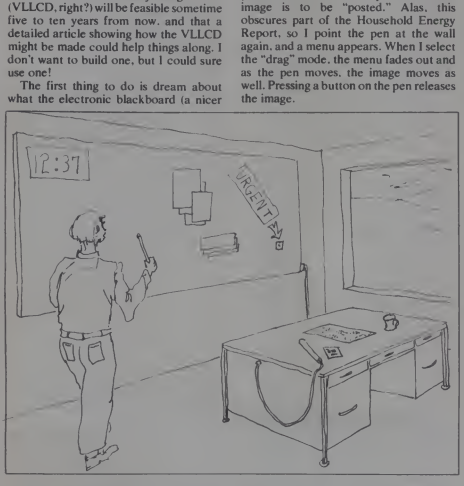


Figure 1. The Fantasy Electronic Blackboard. To the left of the figure is the Electronic Blackboard placed on a wall. Several images are already "posted," including the time of day and the "URGENT" notice. On the desk are some sheets of paper and the scanning bar used to transfer an image from paper to the Electronic Blackboard. The wand in the figure's hand is used to perform editing and control functions which are equivalent to a light pen.

A look at the menu shows a few of my other options:

ERASE: Each image to which I point will be erased, including the parts hidden underneath other images.

LEAF: As I point at an image, it will come to the surface if it is underneath another page. (Note: "image," "page" and "sheet" refer to any part of the display intended to function like a sheet of paper.) If the page is already on top, the one just below will surface.

HAND: With strokes of my pen, I can write on the EB as if the pen was a piece of chalk. A handwriting recognizer transforms my scrawl into neat letters.

DRAW: I can draw pictures with a "paintbrush" style program or do simple CAD (Computer Aided Design).

INDEX: A list of titles for the sheets at this place on the EB will be shown.

The concept of interactive images is powerful. Possible features include:

Ability to design circuit diagrams, PC board and IC layouts, magazine pasteups and layouts, typesetting. (As *Cursor* provides a cassette "magazine" for the PET, I expect to see "EB magazines" in the future.)

Immediately changeable typefonts, reference material arranged with the summary on top, expansions just below, and footnotes below the expansions. (For more along these lines, see *Dream Machine* by Ted Nelson.)

A "fisheye lens" style display. In the center all pages are full-sized. Towards the edge they grow even smaller (like some Escher prints) so thousands of items are present with only a few at full size.

Automated charts and presentations for lectures and meetings.

Remote control from the terminal-desk with suitable scaling up of the images for readability.

Some Current Displays

A look at the properties of current displays is useful in selecting the character of the EB.

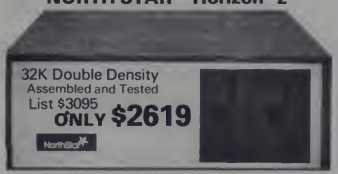
The Blackboard. The chalk or felt-pen blackboard is graphical with the requirement of hand entry and editing. The resolution is low (1/4 inch) and once an image is written on the blackboard it is immobile. The typical half-life of blackboard material is one or two days.

If North Star or Cromemco offer it . .

WE HAVE IT!!

Immediate Delivery at Discount Prices

NORTH STAR Horizon 2



ASSEMBLED

HORIZON 1, DD	$2279	32K, QD, List $2995	2539
HORIZON 2, 32K, DD	$2619	48K, QD, List $4090	3469
32K, QD, List $3595	3049	64K, DD, List $3830	3239
48K, DD, List $3590	3039	64K, QD, List $4330	3669

NORTH STAR APPLICATIONS SOFTWARE

(Exclusive for use with North Star Disk Systems — specify Double or Quad Density)

NORTHWORD, List $399	$339
MAILMANAGER, List $299	249
INFOMANAGER, List $499	419
GENERALLEDGER, List $999	799
ACCOUNTSRECEIVABLE, List $599	499
ACCOUNTSPAYABLE, List $599	499

NORTH STAR HARD DISK HD-18

18 megabytes, plugs into parallel port of North Star Horizon. Utilizes tried-and-proven 14" Century Data Marksman. List $4999.

OUR PRICE $4199

NORTH STAR MDS-A — Double (or Quad) Density Disk System, Kit, List $799. **OUR PRICE $669**
Assembled and Tested, List $899 **SPECIAL $719**

NORTH STAR MEMORY BOARDS

16K Dynamic RAM (RAM 16 A, A), Assembled, List $499	$420
32K (RAM 32, A), Assembled, List $739	$620

INTRODUCTORY SPECIALS ON ...

PREMIUM QUALITY BASF DISKS
CERTIFIED FOR QUAD SYSTEMS

	(Box of ten)
5 ¼" DOUBLE DENSITY DOUBLE SIDED List $57.50	$38.95
8" DOUBLE DENSITY DOUBLE SIDED List $75.00	$47.49

Shipping $2.50 — Free Shipping in Multiple Of Two Boxes

NEW System 3 by CROMEMCO

Now with Dual Double Sided Double Density (over 2 megabytes of Storage) 64K of RAM List $7995

LIMITED TIME $6395

CROMEMCO SYSTEM 2 — Now double Density with Double Sided Drives. Quad Capacity mini floppy disc drives. List $4695 ..... **Only $3899**

CROMEMCO Z-2H

Full 11-megabyte Hard Disk system. Fast Z-80A 4 MHz processor, two floppy disk drives, 64K RAM memory, RS232 special interface, printer interface, and extensive software available. List $9995

OUR PRICE $8489

NEW DOUBLE DENSITY CONTROLLER BOARD From Cromemco

With built-in diagnostics — 16 FDC Controller
List $595 ..... **OUR PRICE $505**

Z-2 COMPUTER SYSTEM List $995 ..... **$845**
SINGLE CARD COMPUTER — SCC-W 4 MHz. List $450 ..... **$382**
NEW COLOR GRAPHICS INTERFACE — SDI List $595 **OUR PRICE $505**
CROMEMCO HDD — 11/22-megabyte Hard Disk for use with existing systems. DMA controller. Transfer rate of 5.6 megabytes/second
HDD-11, List $6995 ..... **OUR PRICE ONLY $5939**
HDD-22, List $11,995 ..... **$10,189**

SHIPPING AND INSURANCE. Add $15 or Horizons, $2.50 for Boards and Software. Hard Disk Systems and Cromemco systems shipped freight collect. Advertised prices are for prepaid orders. Credit card and C.O.D. 2% higher. Deposit may be required on C.O.D. All prices subject to change and offers subject to withdrawal without notice.

WRITE FOR FREE CATALOG

MiniMicroMart, Inc.

master charge
VISA

1618 James Street, Syracuse, NY 13203 (315) 422-4467 TWX 710-541-0431

CIRCLE 157 ON READER SERVICE CARD

Portfolio Master Puts Your Apple II® in the Investment Business.

Standard features of the new program organize investment data and analyze performance. Portfolio Master gives you daily profit and loss, long and short term for each security in the portfolio without a mountain of paperwork. But there's much more you won't find in any other program.

Investors Alarm Clock. (Especially for Option Traders.) The maturity table won't let you forget expiration dates, as well as maturity dates. A signal warns of the impending expiration of all puts, calls, rights and warrants in plenty of time to exercise your options.

Sales Record. Other programs forget sales once they're completed. The Portfolio Master sales table automatically calculates long or short term gain or loss on all sales. Then it keeps a running total for instant recall and tax purposes.

Analyze Advisers. Portfolio Master allows you to evaluate the performance of investment advisers. Store the adviser's name and recommendations and analyze their track record.

Weigh the Information. Enter current prices of securities in the portfolio and you'll see the current value of each holding, its dollar weight in the portfolio and the total portfolio value.

User Friendly. The program includes a complete instruction manual to put you in the management seat immediately.

Track Record. Serious investors have been using the Portfolio Master for the last two years, with great success.

Requires 48K, ROM Applesoft, two disk drives, DOS 3.3 (Supports most printers.)

Portfolio Master

Call (415) 981-5261

Investors Software
P.O.Box 2605
San Francisco, CA 94126

or

Send check, money order or conveniently charge to your Master Charge or Visa. Enclose this coupon with payment of $195. (California residents add $11.70 sales tax.)

Name _____ Master Charge ____ Visa ____

Address _____ Card # _____

City _____ State _____ Expiration Date _____

Zip _____ Signature _____

Dealer inquiries welcome.

CIRCLE 173 ON READER SERVICE CARD

Fantasy, continued...

The Bulletin Board. A bulletin board is "chunky"; the display consists of scraps of paper or cardboard. These chunks are made "off-line" and then posted on the board. Rearrangements are tedious and may result in a loss of information (by dropping a sheaf of pages).

The Desk. A desk is a horizontal bulletin board which does not require pushpins and is capable of supporting heavier loads. All of the working desks I have ever seen carry several layers of opened books, magazines, etc. The desk surface can be used to create new images.

The CRT Terminal. The terminal provides rapid access to an abstract "space" which is usually a representation of the I/O of a computer program. The window is small, say 24 x 80 characters and looks into a "world" many times larger, say from 300,000 to 10 characters. Manipulation of the terminal is by symbols on a keyboard. This is very different from the other displays, since symbols eliminate the positional memory we often use to recall where objects are. The half-life of the screen display is a minute or so; the internal "world" lives for weeks and months.

A desk is a horizontal bulletin board which does not require pushpins and is capable of supporting heavier loads.

Some Design Choices

The four displays analyzed above provide a few clues for the ultimate Electronic Blackboard. If many of their different functions can be combined in the EB, there is a good chance the EB will prove useful. These are the specifications for my design.

1) The resolution must be as good as the printed page. This works out to 100-200 line per inch.

2) Since papers are black-on-white, the EB can also be monochrome.

3) Horizontal surfaces like desks tend to collect things, be stepped on, gather dust and mop up coffee. A vertical surface takes less floor space and does not have to be built for abuse.

4) Updating blackboards, desks and bulletin boards is done in seconds or minutes. The speed of the CRT is costly, and the EB needs only to respond in one to five seconds.

5) The high resolution implies text fonts and full graphics.

6) The equivalent of chalk and eraser must be available.

7) The EB must support "layers" of images, preferably by storing several images for each pixel and allowing selection of the one "on-top" for display. The graphics "window" must be supported. The EB's intelligence should relieve the computer of routine tasks, such as drawing lines and characters.

8) Different sized EB's must not involve significant software changes. (Note: It is assumed that some kind of computer is used to communicate with the Electronic Blackboard. I expect this to be a fourth or fifth generation personal computer. The EB is just another peripheral device.)

9) The EB must be realizable within five to ten years with today's technology.

A Preliminary Design

With the design choices in mind, we can now attempt a very preliminary design—mostly to sketch out a few ideas. The Electronic Blackboards of the future will be more powerful and different in the details.

Of the various display methods available, only the LCD meets the requirement for very low power. Very large CRTs are limited by the strength of their materials to a 20" or 30" diagonal, and the low efficiency of LEDs would make the EB more suitable as the top for an electric range.

The resolution of a printed page suggests from 60 to 200 lines/inch as suitable. Respect for the powers of 2 suggests 128 lines/inch as a good compromise. LCD displays already exist with 0.001" separations between the segments of a digit, so dot size of 0.009" x 0.009" looks attainable.

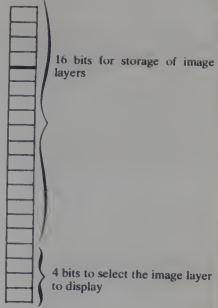


Figure 2. A 16-Layer Display. Each pixel in the EB is described by a 20 bit-storage word. 16 bits are dedicated to the 16 possible "layers" or picture planes of the display. 4 bits select which one of the 16 layers bits to show to the outside world. A small bit of work with a calculator indicates that there's a rosy future in RAM memory manufacturing.

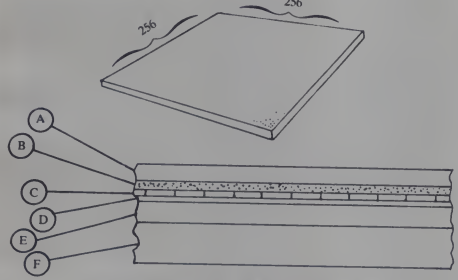
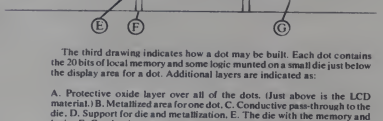


Figure 3. The EB Display "Tile." A close-up section of the tile indicates the various layers required. (Note: We assume that by 1990 a more "vertical" fabrication method will be used where power dissipation is not a problem. Most present electronic chips are composed of a single plane of active elements.) The layers are:

A. Glass cover plate with a transparent metallized ground plane. B. The LCD material. C. The "Dots" layer. D. Conducting paths and bussing to access the dots. E. The *tile's* substrate of the tile for mechanical strength. F. The "backboard" used to hold all of the tiles.



The third drawing indicates how a dot may be built. Each dot contains the 20 bits of local memory and some logic munted on a small die just below the display area for a dot. Additional layers are indicated as:

A. Protective oxide layer over all of the dots. (Just above is the LCD material.) B. Metallized area for one dot. C. Conductive pass-through to the die. D. Support for die and metallization. E. The die with the memory and logic. F. Conductive pass-through to Layer D in the second drawing. G. Support material.

A raster scan or multiplexed display is absurd. For example a 60" x 96" display works out to 94.4 million dots. Refreshed at 60 hz, this gives us 5.67 ghz as the required bandwidth! The solution is to give each dot some local storage in the display, perhaps one bit for each displayable "layer" and a few bits to specify the "layer" to be displayed. Figure 2 indicates the 20 bits required for a 16-layer display. (Note: A 16-layer display can simulate a much "deeper" display by continual updates to the hidden layers.)

Making a large display on a single pane of glass is as absurd as using the raster scan. Instead, break the area into 2" x 2" tiles, with each tile containing a 256 x 256 array of dots. Figure 3 shows a typical tile. With suitable care, the tiles can be identical, permitting different sizes of the EB to be built at no extra cost. The memory requirements for a tile work out to 20 x 64K or around 1.3M bits. With 64K bit memory chips on the market now, I do not feel that the 1.3M bit figure is unreasonable for a device made five years from now. For comparison, my 48K Imsai has about one-third the memory of a tile.

Some severe mechanical problems come with tiles. First, the thermal expansion of the tiles and the supporting structure must match very closely. Second, the dots area on a tile must extend to the very edge, which is probably impossible in an LCD. One solution is to put a layer of tapered fiberoptic light-

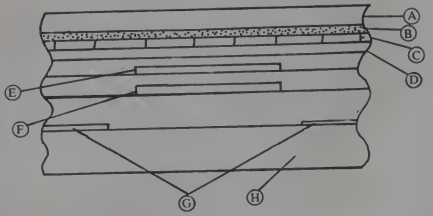


Figure 4. More Layers for a Tile. The addition of a display processor and messages transfers add some new layers to our Tile. We now see:

A. Glass Cover. B. LCD material. C. Dots. D. Dots bussing level. E. Display MPU. F. Messages MPU. G. Parallel Ports. H. Backboard of EB.

pipes over the LCD area to expand the perceived area slightly. The tiles should be easily removed for repair or replacements.

The tile-sized display is an interesting object by itself. The 256 x 256 resolution permits a handheld display of 32 lines of 32 characters with graphics for future calculators.

A box full of tiles leads to the problem of updating the Electronic Blackboard. If each tile is identical, its position on the blackboard must determine the higher valued bits of the positional address of a dot. One scheme might be:

X - position 16 bits

Y - position 16 bits (dot's address on the tile)

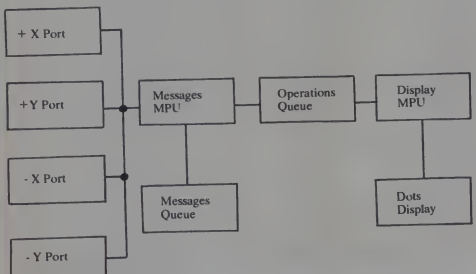


Figure 5. Block Functional Diagram for a Tile. The four parallel ports are controlled by the Messages MPU which decides whether to transfer or accept messages. The Messages Queue holds messages for further transfers to neighboring tiles. The Operations Queue accepts commands for the tile. The Display MPU reads the Operations Queue and updates the dots display.

Layer number 4 bits

Color of dot 1 bit

The update of a dot is then a 5-byte transfer with a few bits reserved for other commands.

There are two basic ways to get the data to a tile. First, a gigantic parallel bus over the entire backboard could be used. Between the microscopic traces and the presence of power lines in the walls, the reliability of a gigabus will be low.

The other method is to give each tile a parallel port for each of the four directions. The tile looks at the addresses, and if the message is not for it, the tile will pass it on to the appropriate neighbor. If 8-bit bidirectional ports are used, the 0.1" spacing used on current PC boards will work well. A total of 12 lines permits a compete handshake for 8-bit data in both directions.

By now, a bit of intelligence is needed in each tile. Figure 4 shows one way to distribute the tasks. At the bottom are the four ports, the backboard address lines and a microprocessor. The job of the MPU is to check the addresses of incoming messages and pass them on to the display MPU or a neighboring tile. If the MPU has 100 bytes of buffer storage, some 20 messages can be stacked up for transfer; in some cases a tile might get four incoming messages at once!

As we see in Figure 5, the incoming messages for a tile are queued up in a small buffer and the display MPU proceeds to update the display memory. Some hardware is needed to select the layer for a given dot which I expect will be multiplexed by alternate accesses by the hardware and the disply MPU. (A 1Mhz 2 phased clock like the 6502 gives 16 refreshes per second over the plane of 64K dots. This is well-matched to the speed of the LCD and human requirements. Better yet, 400ns memory is suitable for holding the images for the display.)

Communication with the EB is now rather simple. A standard 8-bit parallel port is attached *anywhere* on the edge of the display, and the updating information is provided. More rapid updates are given by more than one attachment point. If the tile has a choice between X and Y directions, some randomization will reduce "traffic jams" along the edges of the EB.

A look at potential update speeds is of interest. With one entry port and a 1usec per byte transfer time, update of an 8 1/2" x 11" image takes about eight seconds. More rapid rates, say 100ns per dot, give times of 1/10 second. This speed is entirely acceptable.

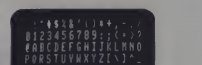
Providing "chalk" is straightforward. A 16 x 16 grid of photosensitive transistors placed below the LCD gives a 1/8" resolution which is as fine as the traditional blackboard. (Software can be provided to

The Text Solution for APPLE II®

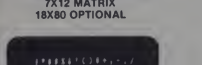
Now APPLE II® Owners Can Solve Text Problems With VIDEOTERM 80 Column by 24 Line Video Display Utilizing 7 X 9 Dot Character Matrix

Perhaps the most annoying shortcoming of the Apple II® is its limitation of displaying only 40 columns by 24 lines of text, all in uppercase. At last, Apple II® owners have a reliable, trouble-free answer to their text display problem. VIDEOTERM generates a full 80 columns by 24 lines of text, in upper and lower case. Twice the number of characters as the standard Apple II® display. And by utilizing a 7 by 9 character matrix, lower case letters have true descenders. But this is only the start.

VIDEOTERM, MANUAL, SWITCHPLATE



7X12 MATRIX 18X80 OPTIONAL



7X9 MATRIX 24X80 STANDARD

VIDEOTERM

BASICs VIDEOTERM lists BASIC programs, both Integer and Applesoft, using the entire 80 columns. Without splitting keywords. Full editing capabilities are offered using the ESCape key sequences for cursor movement. With provision for stop/start, fast scrolling utilizing the standard Control-S entry. And simultaneous on-screen display of text being printed.

Pascal Installation of VIDEOTERM in slot 3 provides Pascal immediate control of the display since Pascal recognizes the board as a standard video display terminal and treats it as such. No changes are needed to Pascal's MISC.INFO or GOTOXY files, although customization directions are provided. All cursor control characters are identical to standard Pascal defaults.

Other Boards The new Microsoft Softcard™ is supported. So is the popular D. C. Hayes Micromodem II™ utilizing customized PROM firmware available from VIDEX. The powerful EasyWriter™ Professional Word Processing System and other word processors are now compatible with VIDEOTERM. Or use the Mountain Hardware ROMWriter™ (or other PROM programmer) to generate your own custom character sets. Naturally, VIDEOTERM conforms to all Apple OEM guidelines, assurance that you will have no conflicts with current or future Apple II+ expansion boards.

Advanced Hardware Design VIDEOTERM's on-board asynchronous crystal clock ensures flicker-free character display. Only the size of the Pascal Language card. VIDEOTERM utilizes CMOS and low power consumption ICs, ensuring cool, reliable operation. All ICs are fully socketed for easy maintenance. Add to that 2K of on-board RAM, 50 or 60 Hz operation, and provision of power and input connectors for a light pen. Problems are designed out, not in.

Available Options The entire display may be altered to inverse video, displaying black characters on a white field. PROMs containing alternate character sets and graphic symbols are available from Videx. A switchplate option allows you to use the same video monitor for either the VIDEOTERM or the standard Apple II+ display, instantly changing displays by flipping a single toggle switch. The switchplate assembly inserts into one of the rear cut-outs in the Apple II+ case so that the toggle switch is readily accessible. And the Videx KEYBOARD ENHANCER can be installed, allowing upper and lower case character entry directly from your Apple II+ keyboard.

Firmware 1K of on-board ROM firmware controls all operation of the VIDEOTERM. No machine language patches are needed for normal VIDEOTERM use.

Firmware Varsion 2.0

Characters	7 x 9 matrix	Display	24 x 80 (full descenders)
Options	7 x 12 matrix option. Alternate user definable character set option. Inverse video option		18 x 80 (7 x 12 matrix with full descenders)

Want to know more? Contact your local Apple dealer today for a demonstration. VIDEOTERM is available through your local dealer or direct from Videx in Corvallis, Oregon. Or send for the VIDEOTERM Owners Reference Manual and deduct the amount if you decide to purchase. Upgrade your Apple II+ to full terminal capabilities for half the cost of a terminal. VIDEOTERM. At last.

PRICE:
- **VIDEOTERM Includes manual** $345
- **SWITCHPLATE** $ 19
- **MANUAL ratund with purchasa** $ 19
- **7 x 12 CHARACTER SET** $ 39
- **MICROMODEM FIRMWARE** $ 25

Apple II+ is a trademark of Apple Computer Inc
ROMWriter™ is a trademark of Mountain Hardware Inc
Micromodem II™ is a trademark of D C Hayes Associates Inc
Softcard™ is a trademark of Microsoft
EasyWriter™ is a trademark of Information Unlimited Software Inc

APPLE II® OWNERS!

Introducing the

KEYBOARD & DISPLAY ENHANCER

- ***PUT THE SHIFT AND SHIFT LOCK BACK WHERE IT BELONGS***
- ***SEE REAL UPPER AND lower CASE ON THE SCREEN***
- ***ACCESS ALL YOUR KEYBOARD ASCII CHARACTERS***

Videx has the perfect companion for your word processor software: the **KEYBOARD AND DISPLAY ENHANCER**. Install the enhancer in your APPLE II and be typing in lower case just like a typewriter. If you want an upper case character, use the SHIFT key or the CTRL key for shift lock. Not only that, but you see upper and lower case on the screen as you type. Perfectly compatible with Apple Writer and other word processors like, for example Super Text.

If you want to program in BASIC just put it back into the alpha lock mode, and you have the original keyboard back with a few improvements. Now you can enter those elusive 9 characters directly from the keyboard, or require the Control key to be pressed with the RESET to prevent accidental resets.

KEYBOARD AND DISPLAY ENHANCER is recommended for use with all revisions of the APPLE II. It includes 6 ICs, and EPROM and dip switches mounted on a PC board, and a jumper cable. Easy installation, meaning no soldering or cutting traces. Alternate default modes are dip switch selectable. You can even remap the keyboard, selecting an alternate character set, for custom applications.

PRICE • KDE-700 (REV. 7 or greater) . . . . . **$129.**
• KDE-900 (REV. 6 or less) . . . . . **$129.**

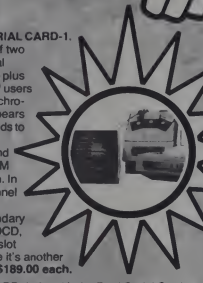
Apple II® is a trademark of Apple Computer, Inc.

Videx

VIDEX
897 N.W. Grant Avenue
Corvallis, Oregon 97330
Phone (503) 758-0521

CIRCLE 240 ON READER SERVICE CARD

GIFTS FROM PROMETHEUS
NEW for APPLE II(1)
Advanced products at
Down-to-Earth
PRICES



DUAL SERIAL CARD-1. All functions of two independent serial cards on one board – plus more. Provides Apple II(1) users with two simultaneous asynchronous serial channels. DSC-1 appears as two separate logical serial cards to the Apple II(1). Fully software compatible with all Apple II's(1) and Microsoft software. 2716 EPROM used for easy driver modification. In addition, the second serial channel supports these extra features: • Strapable DCE/DTE. • Secondary RS-232 handshake functions (DCD, DTR, RSR) • Strapable logical slot location and hardware looks like it's another slot. **Order: PP-DSC-1 @ $189.00 each.**

DUAL SERIAL/PARALLEL CARD-1. As with the Dual Serial Card-1 (above), the Dual Serial/Parallel-1 provides Apple users with simultaneous use of one full serial port and one parallel port. Both ports strapable for any Apple peripheral slot. Fully compatible with all Apple and Softcard (CP/M) software. Drivers for serial interface and Centronics parallel interface are contained in modifiable industry standard EPROM. Serial port is configured like DSC-1. **Order: PP-DSP-1 @ $189.00 each.**

MEMORY EXPANSION MODULE-1. Expand your Apple II(1) to a full 64K RAM system with highest quality 16K dynamic RAMS. Fully buffered to provide reliable operation – even with fully loaded Apples. Total compatibility with Microsoft Softcard(2)/CP/M(3) and all Apple software. Supplied complete with installation instructions and test program.
Order: PP-MEM-1 @ $149.50 each.

PASCAL MT+ MEM-1. A modular native Z-80 code Pascal compiler. ISO standard. Includes a MEM-1 (detailed above). Have a full Pascal compiler at half the Apple price. Requires a Microsoft Softcard(2) and two disk drives. Note that the Pascal MT+ alone is normally $250.00.
Order: PP-PMT-1 @ $299.00 each.

16K RAM ADD-ON KITS. For TRS-80 and Apple II(1). Eight (8) full-specification industry standard 16K RAMS. These are not seconds.
Order: PP-RAK-16 @ $29.00 each.

All Prometheus boards are completely tested and burned-in prior to shipment. One-year warranty covers parts and labor. **MONEY BACK GUARANTEE:** Order now without risk. Boards may be returned, in good condition, after up to 10 days of trial for a full and prompt cash refund. California: add 6% tax; BART Counties, 6½%. Orders under $150, add $3.00 postage, for handling charge. Freight allowed on orders over $150. *Dealer inquiries invited. Quantity discounts available.*

VISA MasterCard

PROMETHEUS
PROMETHEUS PRODUCTS INCORPORATED
4509 Thompson Ct. • Fremont, CA 94538 • (415) 791-0266

Registered Trade Marks: (1) Apple Computers, Inc. (2) Microsoft Consumer Products (3) Digital Research, Inc.
CIRCLE 255 ON READER SERVICE CARD

Fantasy, continued...

do scaling or cleanup of the user's scrawls.) A pen-sized wand with an LED on the tip will activate the photogrid.

If the lens on the LED is ellipsoidal, the light beam will be an oval. This permits the definition of a "brush-direction" for calligraphic and artistic effects.

Our message transfer trick can now run backwards to send lightpen information back to the host computer. One corner of the display is the pickup point.

Bells and Whistles

We left the tile as a rather stupid dual processor with a lot of memory. The provision of more intelligence can drastically reduce the number of update messages for routine operations. The extra bits in the 5-byte update may be used to define some other operations.

Some sample command families are:

1. Graphics by drawing vectors. A truly sophisticated tile would be able to tell its neighbors about long vectors extending beyond the boundaries of the tile.

2. Graphics within a "hidden" layer. Definition of various line types and line widths.

3. Drawing of half-tone images by sending the differences from the previously sent scan-line.

4. Area-oriented selections of which layer to display. Select the area by defining the corners of a square or polygon. Most cases will simply be rectangles defining the boundary of an image.

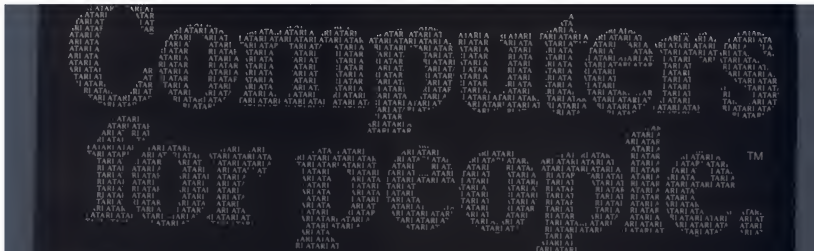
5. Font definitions flexible enough to permit special symbols. This requires some way to send characters and translate them to dot-updates locally. While we are at it, how about a "local" cursor for each layer or fonted "text." This naturally extends to other intelligent terminal functions too numerous to mention here.

6. 256 layers for each dot. Perhaps this is overkill.

7. Recall that many EBs will be in rooms with desks as in the fantasy described at the beginning of this article. On each desk place a smaller EB which can function both independently and as a "window" to the larger EB. Military command posts, mission controls and power plants could use this one well.

8. LCD displays work by careful use of polarized light. If the user wears polarized glasses and the individual dots have alternating senses of polarization, a three dimensional stereoscopic display can be drawn.

Well, there's some food for thought. Note that EBs provide yet another way to sell vast quantities of memory and processing power. In due time, the electronics manufacturers will want this, as the alternative will probably be to put microprocessors in toothbrushes. I will reply to any serious letters concerning this article. □



TM

"Atari graphics and sound stand in a class by themselves."
David D. Thornburg
Compute Magazine, November/December 1980

"The Atari machine is the most extraordinary computer graphics box ever made..."
Ted Nelson
Creative Computing Magazine, June 1980

"Its superiority lies in three areas: drawing fancy pictures (in color), playing music, and printing English characters onto the screen. Though the Apple can do all these things, Atari does them better."
Russell Walter
"Underground Guide to Buying a Computer"
Published 1980, SCELBI Publications

"...so well packaged that it is the first personal computer I've used that I'm willing to set up in the living room."
Ken Skier, OnComputing, Inc. Summer 1980

"...well constructed, sleekly designed and user-friendly—expect reliable equipment, and strong maintenance and software support."
Videoplay
December, 1980

What computer people are saying about Computers for people.™

To find out about the ATARI® 800™ Computer first hand ask your local computer dealer for a hands on demonstration.
Or call, 800-538-8547 (In California 800-672-1404)

ATARI

Computers for people.

© 1980 Atari, Inc.
A Warner Communications Company

For further information write: Atari Inc., Computer Division, 1196 Borregas Avenue, Sunnyvale CA 94086 Dept. C 31

CIRCLE 115 ON READER SERVICE CARD

The Vermont Inn Syndrome for Programmers

Paul F. Doering

Mr. Philo Dater has given up his seat on the New York Stock Exchange in favor of a quiet life as owner/manager of Ye Olde Country Inn in rural Rockrib, VT.

Events like this occur so often that psychologists have dubbed any such abrupt, voluntary dislocation in lifestyle "the Vermont inn syndrome." Our Mister Dater bought the inn from an earlier owner who had failed to make a go of it. Dater also will fail. He will resell it with little effort to the next victim. He will have lost most of his savings. He will resume his previous profession.

Three factors tend to ensure failure:

Lack of the requisite skills. Success in one job may not prepare you for another.

Insufficient financial resources. It is easy to underestimate the costs of an unfamiliar enterprise and to exaggerate the potential income.

Paul F. Doering, 56 Elmore Rd., Rochester, NY 14618.

Romanticized image of the new lifestyle. Fantasy leads to suppressing foreknowledge of the problems while amplifying the attractive aspects.

There are similarities between victims of the Vermont inn syndrome and people who try to sell their own software. Although a programmer doesn't have to buy or resell a business, he may be lured by the prospect of life as an entrepreneur. More to the point, failure can occur for the same reasons.

Coding that was once merely inefficient is now incomprehensible.

Skeptical? Let's follow the adventures of Philo Dater in establishing his own software business, instead of running an inn.

Down Malady Lane

Philo is a good stockbroker. He has no background in computer science; but on the strength of his hunch that a personal computer will help him do quick market analyses, he buys a PDQ-80.

A bright fellow, Philo learns Basic and starts work on his trend-analysis program. By working evenings at home (and sneaking moments at the office), he delights himself by graphing the recent performance of his favorite speculative stock, UFO Labs. For a week thereafter he adds the daily closing and reruns the program.

He knows, of course, that this feat is not really analysis. Tiring of it, he looks up some curve-fitting techniques and tries programming them. Suddenly he finds that a cubic polynomial has actually predicted the meandering of UFO's stock price with a three-day lead.

Fired by dreams of prescience, he tests his routine for a couple of weeks. It is more often right than wrong. His sense of wonder crowds out vague misgivings about the lack of theoretical justification. Had he been buying and selling with this advice, he would have made 17% on his investment. Wow!

A colleague remarks that people are making a pile of money by selling programs they've written. Philo has visions of riches and decides to market his predictor. He sets up a company, Future Stock, and buys space in a hobby magazine. Startled by the cost of advertising, he prices his program at $100 to cover expenses.

Philo's program is slow and bulky, but it seems to work. He dumps copies onto a carton of cassettes and awaits the rush of orders. From the disappointing response he learns that people want a listing, prefer disks, need data on other stocks, and won't pay $100.

The Critical Lilst

Poor Philo! He shells out $1500 for a printer and a disk, postponing the kids' orthodontia. He spends time learning the disk operating system. The one cassette copy he does manage to sell is returned as unloadable. Philo replaces the cassette twice; but he finally agrees to a refund, suspicious he's been the target of a pirate.

His family life languishes while he works long hours compiling a data base of other

stocks, and he nearly self-destructs on finding that his polynomial is ineffective for most them. He now has a backlog of twenty orders at the reduced price of $50. The paying customers are getting nervous over the delays.

The disorganized structure of his program hampers his efforts to modify it. Simple changes have unexpected effects. Coding that was once merely inefficient is now incomprehensible.

Benumbed, Philo returns all the money and withdraws from the software business. Future Stock has folded; the inn is closed.

We all agree that Philo's story is deliberately gloomy, but the moral is not less valid for being made emphatically. He stumbled over all three of the reasons for failure.

An Apple a Day

Philo thinks of himself as an honest man. The truth is that he was dishonest intellectually, offering for sale a product he couldn't prove functional. Were he now to prepare a guide for software sellers. Philo might make these observations:

Know your subject. If adapting your expertise to a computer requires new knowledge of mathematics, logic, or some other unfamiliar field, learn it thoroughly. It's not enough to find an algorithm that works. You must understand why it works so that you can adjust it if necessary.

Code efficiently. Remember that the passing of time will make you a stranger to your own work. Your only defense against confusion is to program so clearly that your intent is evident to anyone—even you.

The good program turns a computer into a consultant—faster than its teacher but not smarter.

Sell for a popular configuration to avoid limiting your market. Own that configuration yourself, and learn how best to use it.

Price your product according to its value, not its cost. If you can't make money on that basis, drop the project.

Don't pre-advertise. The pressure of unfillable orders may tempt you to ship an inferior product.

Test your work scientifically. Make sure you've tried all loops, all reasonable combinations of data, all modes your customer might attempt from your description of the product's capabilities. Don't dismiss those haunting uncertainties about the efficacy of the program.

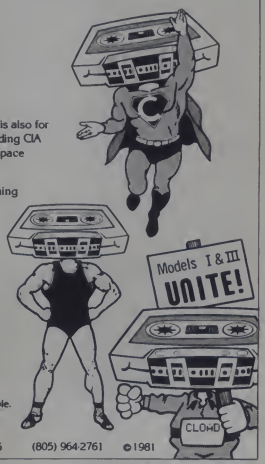
Patients and Prudence

Does the fable of Philo imply that no one should try to be an independent supplier of software? Of course not. What we can learn from it is that each person must grasp the factors that influence success. If any part of Philo's story is even remotely a parody of your circumstances, that parallel is a warning.

What a programmer sells is experience formulated as computer code. While the ability to code well is important, it is the experience that is crucial. The good program turns a computer into a consultant—faster than its teacher but not smarter.

If you have experience both in your primary field and in programming, you can open your inn with confidence. Otherwise, stick to being a guest. □

WE'RE EXCITED . . .



CLOAD MAGAZINE, the cassette magazine for your **TRS-80** Model I, is also for your TRS-80 Model III! Over 90% of the monthly offerings on cassette (including CIA Adventure, Hustle, States Quiz, RAM Test, and Alien — a machine language space invader-type game) will load and run on the Model III directly.

Now you Model I'ers and Model III'ers can both spend your time RUNning programs, rather than ENTERing and EDITing them. Each tape contains 6 to 8 ready-to-**CLOAD** fun, educational, and practical programs, delivered to your door by First Class Mail each month.

Join Clyde's march for reduced keystrokes, and Exercise your computer with Super, ready-to-load programs.

Get **CLOAD MAGAZINE** and get excited too!

The Fine Print:

Overseas rates slightly higher—please write for them.
Back issues available—ask for our list.*
TRS-80 is a trademark of Tandy Corporation
California residents add 6% to single copies and anthologies. Programs are for Level II 16K, Model III 16K, and occasionally for disks.

PRICES

1 year subscription	$42.00
6 month subscription	$23.00
Single copies	$4.50
Anthology-volume 1	$10.00
Anthology-volume 2	$15.00

*24 Level I back issues also available.
Mastercard/Visa Welcome.

CLOAD MAGAZINE INC. P.O. Box 1267 Goleta, CA 93116 (805) 964-2761 ©1981

A Special Adaptation Of The Paddle Control For The Severely Handicapped Programmer.

Tero's Apple

Jan Sand

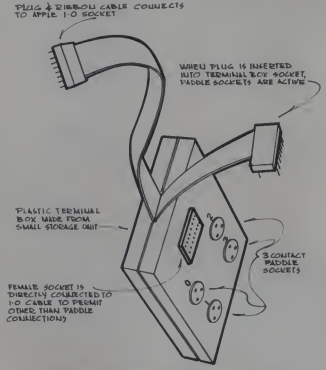
Tero working at his Apple. Left of the keyboard are his disk units. In the background is his TV set, which he uses for a monitor. In the very near foreground is a support for the tubes which go to his respiratory.

My son, Tero, was three years old when he was hit by a speeding sports car in Israel. I was on assignment there for the United Nations, and my wife is a Finnish National. It was though her citizenship that the Finnish Government most generously made Tero, who was born in Tennesse, a Finnish citizen so that they could accept him into the Finnish medical system and keep him alive these last twelve years. But just keeping him alive is not enough. Although he is totally paralyzed from the neck down, he has an extremely intelligent and active mind and our family spent many hours a day at his hospital in Helsinki keeping his hungry curiosity well fed.

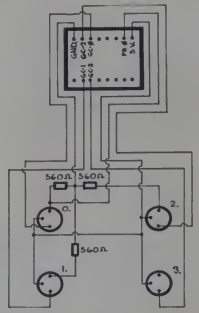
Jan Sand, Lehtotie 12, Helsinki 63, Finland.

He was already adept at using an electric typewriter with a stick in his mouth when his Apple II arrived in the late Spring of 1979, and he and his brother, Tapio, had already read through a manual on Basic. In about four weeks they were writing their own graphics programs. The keyboard offered no problems, but Tero had no way to play games with the paddles. So, Tapio and I worked out the system explained in this article.

I constructed a terminal box which plugged into the I/O socket in the Apple and made it easier to reach. A second ribbon cable emerged from the box itself, which connected the four paddle inputs on the terminal box to the individual three-connector paddle sockets. That way, the remote I/O socket may be used either as a paddle input, or for other connections.


PLUG & RIBBON CABLE CONNECTS TO APPLE I-O SOCKET
WHEN PLUG IS INSERTED INTO TERMINAL BOX SOCKET, PADDLE SOCKETS ARE ACTIVE
PLASTIC TERMINAL BOX MADE FROM SMALL STORAGE UNIT
3 CONTACT PADDLE SOCKETS
FEMALE SOCKET IS DIRECTLY CONNECTED TO I-O CABLE TO PERMIT OTHER THAN PADDLE CONNECTIONS)

I-O EXTENSION TERMINAL BOX & PADDLE CONNECTORS



WIRING DIAGRAM I-O SOCKET EXTENSION PADDLE SOCKETS

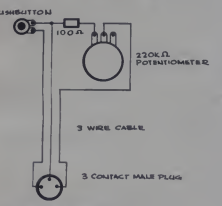
Engineer Soini, who works for Comico OY, the Finnish agency for Apple, helped me with the wiring. The people at Comico also devised a special switch for Tero, which he operates himself, as a hold on the shift key. I substituted a 220K ohm resistor for the 100K ohm resistor normally found in the Apple paddle to allow a smaller angular swing of the potentiometer. A small push forward allows Tero to fire at flying saucers and alien invaders with the push button. His scores at this and other games are at least equal to a normally adept person, and usually far superior. He skunks me every time. The 220K potentiometer is not commonly available in New York, but the more easily obtainable 500K potentiometer may make control oversensitive.

The modified paddle control is normally clamped to the table that holds Tero's keyboard. I have made the keyboard detachable from the Apple. Now it can be slid into holders to place it over the IBM typewriter keyboard on a stand. This holds the typewriter at a convenient angle and distance from his face. The aluminum strip which acts as an extension arm on the potentiometer is bent back to reduce the distance between the mouth stick hole and the Apple keyboard. The Apple case is placed in a metal basket behind the tilting typewriter table on a stand that rolls over his bed.

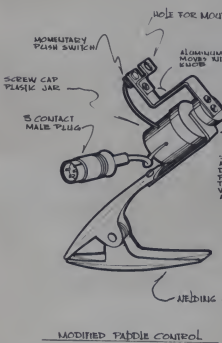
The wiring diagrams and the drawings of the modified paddle and terminal box should make this relatively simple mechanism clear. Tero and his brother, Tapio, are interested in contacting other people who work with the Apple, so Tero's address is:

Tero Sand
Auroran Sairaala
Osasto 8/2
Nordenskjöldinkatu 25
00250 Helsinki 25
Finland

Since we sometimes like to play games together requiring paddles, I constructed a second paddle electrically the same as Tero's but much simpler mechanically. It consists of a plastic jar which contains the potentiometer and wiring with the pushbutton mounted on the side and a normal knob on the cover, from which the shaft protrudes. The terminal box allows either of the paddles to be plugged into any of the paddle inputs. □



WIRING DIAGRAM
MODIFIED PADDLE CONTROL


HOLE FOR MOUTH STICK
MOMENTARY PUSH SWITCH
ALUMINUM STRIP WHICH MOVES WITH POTENTIOMETER KNOB
SCREW CAP PLASTIC JAR
POTENTIOMETER KNOB
3 CONTACT MALE PLUG
STEEL STRIP BENT AT RIGHT ANGLE & DRILLED TO RECEIVE POTENTIOMETER THREADED END TUBE WHICH HOLDS JAR CAP ALSO
WELDING CLAMP
MODIFIED PADDLE CONTROL

FULL SCREEN TEXT EDITORS FOR THE TRS-80*

Now there are products that will allow you to program like the professionals do. If you enjoy the sophistication of writing your own programs then you are in for a real treat when you use our editors. Features include: full screen display; completes control over scrolling and cursor movement; character change, insert, delete; insert, delete, copy, move lines or blocks of lines; renumber; global find and change.

BASIC editor runs from tape or disk. Once loaded, a single command invokes our extended edit mode, with powers and abilities far beyond those of conventional editing! Advanced features include user definable macro keys and the powerful program restructuring tool SELECTIVE RENUMBER.

EDTASM editors are compatible with EDTASM source tape files. Disk version includes patch to run Radio Shack* EDTASM from disk! All products are shipped on tape for level 2 machines and include a comprehensive owner's manual.

The Text Editor for BASIC Order #1010-20 . . . . **24.95**

The Text Editors for EDTASM Source Files:
Tape Version Order #1010-30 . . . . . **24.95**

Disk Version (Req. 32K and up) Order #1010-31 . **34.95**

New: XBUG self-relocating debugging tool with multi-speed single step facility.
Order #1020-10 . . . . . **$19.95**

Send check or money order (no CODs) to If ordering by credit card, please include all information on credit card.

COMPUTER APPLICATIONS UNLIMITED™
Post Office Box 214, Dept. 188 Rye, New York 10580

N.Y. State residents please add applicable sales tax. Please allow 4-6 weeks delivery. Dealer inquiries invited.
**Radio Shack and TRS-80 are registered trademarks of The Tandy Corp.*

CIRCLE 134 ON READER SERVICE CARD

TURN YOUR TYPEWRITER INTO A PRINTER

New KGS-80 Keyboard Actuator.

Dealer Inquiries Invited

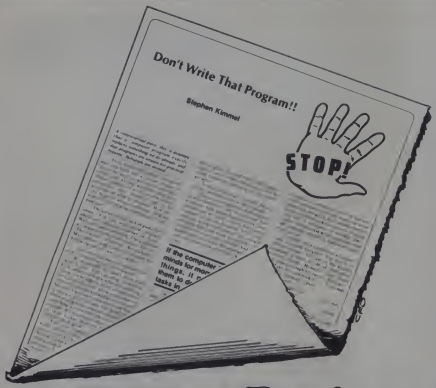
- ☐ Because of its hardware interface, the KGS-80 is the only actuator that is delivered ready to set up and run with no alteration of your existing software.
- ☐ Rests on keyboard of IBM Selectric, SCM or other typewriters. May be installed or removed in seconds.
- ☐ New third generation unit engineered and manufactured for reliability and long life by Kogyosha Co. Ltd., Japan's largest manufacturer of DC solenoids.
- ☐ Price $599 FOB New York, NY
- ☐ "Y" cable switch option allows alternative operation with high speed matrix printer.

For further information, call (201) 569-8769.

Authorized Importer

NIK International Trading Inc.
114 Liberty St. Suite 204, New York, NY 10006

CIRCLE 176 ON READER SERVICE CARD



Write That Program !!

The August 1980 issue of Creative Computing *carried the admonishment, "Don't Write That Program," by Stephen Kimmel. Many readers, it seems, felt that Steve was way off base and wrote to tell us why. The following is a representative sample of the rebuttals we received, along with one supportive note. – EBS*

Worthless Programs?

Since I no longer earn my living by programming, I write short elegant programs for my home computer as a method of intellectual relaxation. I use these "worthless" programs only once, each: either to explore arcane ambiguities in programming manuals, or to determine whether the bugs in my few "worthwhile" programs are mine or belong to the compiler maker (so far, we are about even). There is nothing in any of these programming exercises that would meet with Mr. Kimmel's approval.

My wife, on the other hand, spends her working day at a computer terminal in a research laboratory, developing esoteric applications (none of which have numerical solutions) for which somebody believes there are economic payoffs. When she comes home she repairs clocks or does crossword puzzles. Obviously, she gets no relaxation from solving computer puzzles on her own time.

The productive application for my computer is as a word processor – I use it while writing articles for boating magazines. Since I get paid for writing, and not for programming, I bought the word processor software. I am quite sure that my word-processing program is a "worthwhile" one, under Mr. Kimmel's rules, and he would insist that I should have programmed it myself. The only reason I didn't is that I made more money writing articles during the time it would have taken me to have written and debugged the program than I paid for it. Mr. Kimmel's rules miss this point entirely.

Faulty economics aside, the major fallacy arises from his basic philosophy as to why computers exist. Mr. Kimmel elaborates on a common error from the computer mystique – usually offered by persons who don't understand computers and are a little afraid of them. He insists that . . . the computer is *supposed to* . . . release the human for bigger and better things" (emphasis added).

Nonsense! The computer is a man-made artifact. It is a tool to be used as its owners intend it to be used. It isn't "supposed to" do anything.

Now it happens that the computer is unique as a tool in that the intellectual effort required to program it is different in kind than is the intellectual effort required to use most tools properly. For this very reason, one can obtain intellectual enjoyment from the act of programming a computer, for fun; just as one can obtain physical enjoyment from the act of swinging an axe to chop wood, if it is for fun.

Programming as an intellectual exercise is an end in itself. As long as you are doing it on your own time and using your own computer, what you should program is not subject to accountants' rules. Program whatever suits your fancy – whether it saves you five minutes, or none. If you prefer to compute an insignificant value to a precision (not "accuracy," Mr. Kimmel) of 14 significant figures, rather than to guess at it, don't let Mr. Kimmel tell you not to.

Program to increase your programming skills. If you are lucky enough to have the opportunity, practice programming until you can think like a computer when you want to. After you have done this long enough, you will develop a feeling for what you can make the computer do for you, and how much effort it will require.

The only rule you have to remember is: You are the only one who can determine whether or not you are wasting your own time and effort by running a "worthless" program. After all, what else would you have done with the five minutes! – *Murray L. Lesser, 2474 Hunter Brook Rd., Yorktown Heights, NY 10598.*

Practice Makes Perfect

Practice is a strange and wonderful creature. Knowing intellectually how to deploy a parachute and being able to do it at terminal velocity are two different things. Just as knowing how a magic trick works does not make one a magician, understanding a for-next loop does not a programmer make.

Mr. Kimmel's recommendations on when and why not to write programs assume that computers purchased for home use are dedicated to the same purposes as those purchased for industry and operated by highly trained programmers. Businesses buy computers for their efficiency on a cost-effective basis. Computer hobbyists do not. Neither my computer nor my home is operated as a business (non-profit organization, perhaps). My computer does not save me time. It eats it up and I love it. I scrounge all day for extra minutes to feed my computer. The simple programs I create, debug, and run are my programming education.

The following are my suggestions to help you determine when to write a program.

80 COLUMN GRAPHICS

The Integrated Visible Memory for the PET has now been redesigned for the new 12" screen 80 column and forthcoming 40 column PET computers from Commodore. Like earlier MTU units, the new K-1008-43 package mounts inside the PET case for total protection. To make the power and flexibility of the 320 by 200 bit mapped pixel graphics display easily accessible, we have designed the Keyword Graphic Program. This adds 45 graphics commands to Commodore BASIC. If you have been waiting for easy to use, high resolution graphics for your PET, isn't it time you called MTU?

The image on the screen was created by the program below.

```
10 VISMEM: CLEAR
20 P=16384: Q=1000
30 XP=144: XR=4.5*3.141592/7
40 YP=56: YR=1: ZP=64
50 XF=XR/XP: YF=YP/YR: ZF=XR/ZP
60 FOR Z1=-Q TO Q-1
70 IF Z1<-ZP OR Z1>ZP GOTO 150
80 ZT=Z1*XP/ZP: ZZ=Z1
90 XL=INT(.5+SQR(XP*XP-ZT*ZT))
100 FOR XI=-XL TO XL
110 XT=SQR(XI*XI+ZT*ZT)*XF: XX=XI
120 YY=(SIN(XT)+.4*SIN(3*XT))*YF
130 GOSUB 210
140 NEXT XI
150 NEXT Z1
160 STOP
170 X1=XX+ZZ+P
180 Y1=YY-ZZ+Q
190 GMODE 1: MOVE X1,Y1: PLOTX
200 IF Y1<0 GOTO 230
210 GMODE 2: LINE X1,Y1-1,X1,0
220 RETURN
```

K-1008-43M Manual only $10 (credited toward purchase)
k-1008-43 Complete ready to install package $495

Mastercharge and Visa accepted

Write or call today for our full line catalog describing all MTU 6502 products, including our high speed 8" Floppy Disk Controller for up to 4 megabytes of PET storage.

MTU
Micro Technology Unlimited
2806 Hillsborough Street
P O Box 12106
Raleigh, NC 27605 USA
(919)833 1458

NOW 80 COLUMN PETS CAN HAVE MTU HIGH RESOLUTION GRAPHICS

Write, continued...

1. Write the program even if you will never use it. Many programs are written for the challenge of writing the program. They become acceptable ends in themselves. You are not wasting time. You are practicing and practicing is learning. It will help programming become second nature to you.

2. Write the program even if it makes the task more complex. It is easier and quicker for me to balance my checkbook with a calculator than to keep an entire book as a data tape, but with the data tape I have had no errors since I began using it 18 months ago—a remarkable feat for me. The "large" computer is not intrinsically more accurate than my small calculator, but the program I wrote forces me to be more careful, thus the advantage.

3. Power up every chance you get. Every housewife who asks her computer to convert a recipe from eight people to four is practicing. What may seem simple wasted effort is building abilities and attitudes for the really big, undreamed-of tasks in the decades ahead. Remember, the greatest musicians continue to play the simplest scales daily.

4. Write that program even if archaic methods might work better. When the auto was first invented it was noisy, slow and subject to frequent breakdowns. Yet, look what leaving the more reliable horse at home led to. We are at the beginning of an era with computers. The fact is that in our homes they are going to be more show than performance for a while.

5. Write the program even if absolute accuracy is not necessary. Accuracy in all areas of life is becoming more important. Those who become accustomed to it now will be more prepared to deal with it in the future.

Computers have broken out of the science centers and into our homes. We neophytes are just beginning to acquire the simplest understanding of them. As with an unfamiliar animal, we trust computers only as far as we can monitor them with our minds. As they prove (to us) safe and reliable we will write programs of grandeur.

In the meantime every power-up is melting away the psychological fear we have of computers. As with ripcords, it will take more than a knowledge of the facts to make computerization of our homes second nature. The tasks ahead will require greater abilities. The more time we spend with our fingers on the keyboard the farther we can go. Practice. Learn. Practice. Write that program and have fun! —*Randall Riley, 2771 Barclay Messerley Rd., Southington, OH 44470.*

On Hobby Critics

Computers are tools. But consider for a moment what that means. A tool, generally speaking, is anything which is used in pursuit of some good—it is a means to an end. Some tools are time savers: hammers, looms, telephones, computers. Some tools allow a person or group of persons to do what they could not do without the tools: rocket ships, cyclotrons, microscopes, computers.

Humans are tool users. I suspect (but I haven't checked this out) that the more advanced a civilization is, the more time and energy its members devote to tools—not only using tools, but designing, building, repairing, enhancing, decorating, admiring, and playing with them. This goes also for tools used to build tools, tools used to repair tools, tools used to decorate tools; and tools used to build tools used to build tools. At the very top of this pyramid rests the general purpose computer.

We are urged not only to make our computers do something "useful," but also to avoid "reinventing the wheel."

Tools are capital: we give up a portion of our time and energy to construct a tool because we expect to save time and energy later on. I suspect that hardly a tool has ever been invented which did not become useful for some purpose of which its original designer was unaware. One of the most common expected uses for tools is recreation. In a relatively free and productive society, many tools are developed for purely commercial ventures which, if successful, can make the use of the tools so widespread that they become easily available to people who have little or no commercial use for them.

Carpentry and woodworking tools are used not only by professional carpenters and woodworkers, but also by hobbyists—people who delight simply in the use of the tools. Radio communication quickly became a hobby. And a widespread recreational use of a tool will sooner or later generate a new commercial market involving the tool—a market aimed at the hobbyists. Perhaps the first, and still the most pervasive, instance of a tool-become-recreation in twentieth century Western society is the automobile.

The purpose of something, therefore, depends entirely on its user: is the tool being used for a commercial venture? To simplify an everyday task? For recreation?

The critics will not go away. We are urged not only to make our computers do something "useful" (in some non-recreational way), but also to avoid "reinventing the wheel." The two issues are closely related and proceed from the same underlying misconception.

Who (the critic might argue) in his right mind would spend a significant amount of time and energy in any activity in order to bring about a certain goal, if he could spend less time and less energy by using some tool? And who would bother to fashion a tool suitable for a given task if he could, with less effort, obtain a tool already made for him? Do I forge a hammer when I need one? No, of course not. I pop out to the hardware store and buy one. Do I reinvent the telephone in order to communicate with friends at great distances? No; I bargain for the results of other people's time and energy (capital investment), thereby saving my own time and energy for other things.

But wait! The critic has assumed that the purpose of any tool is to use it for something else; he does not understand the recreational use of tools. Sometimes "reinventing the wheel" may be a great deal of fun. It may also be excellent education. And even if it is not "reinventing the wheel" which my hobby calls for, I may, nevertheless, enjoy building a wheel, even when it is easier to purchase one from the store.

Well, clearly the point in a recreational activity is not (or not merely) to make use of a tool in order to get on with other things. Rather, it is precisely the attention to the tool—to the reinvention of the wheel—which makes an activity a hobby. I may want a computer for many reasons: a fast powerful calculator for my business or scientific pursuits; a status symbol; a baby-sitter; a security controller.

But as a hobbyist I will enjoy building a computer and writing programs for it; just what the programs do is often largely irrelevant. There are a thousand versions of "Star Trek" and probably just as many "Mastermind" programs. But I might enjoy writing my own thousand-and-first version. To suggest that this is somehow not useful or not practical or not justified is to make the profoundly mistaken assumption that play, recreation, invention and practice are somehow not useful, not practical, not justified.

Imagine someone asking what your piano is for. What good is it? What practical application has it? And anyway, if you really must have music, can't you get better music from your stereo? The poor chap who would ask such questions would probably be an insensitive brute who knew nothing of music.

Imagine being told that it is silly to go out to a well-manicured landscape and attempt to use a thin metal club to propel a small ball a great distance into a hole in the ground, when it is far easier just to pick up the ball, walk to the hole, and drop it in. (And anyway, where does it get you? Why bother?)

Of course, since computers are so commonly used as non-recreational tools (whereas pianos and golf equipment are most commonly used only in recreation), it is not surprising that many people do not yet realize that there is a growing number of dedicated, fanatical, addicted people called computer hobbyists. When it becomes common knowledge that computers are also playthings, and when most everyone has had a chance to play with them, then questions such as "What is it good for?" will be less likely to arise. And admonishments to use the computer only for tasks which could not otherwise easily be done, or to avoid "reinventing the wheel," will cease to be made.—*David B. Suits, One Lomb Memorial Dr., Rochester, NY 14623.*

Cheers for Kimmel

Hey! Dirty pool!

You asked for rebuttals to "Don't Write That Program," but what about supporting comment? Far from being controversial, I think Mr. Kimmel stated what should be obvious about computers—first and foremost, they are tools. You do not use a bulldozer to remove an anthill; you do not use a computer to "convert" a recipe. Or at least you shouldn't.

That this hasn't sunk in where it should is obvious when one glances at any software list or the table of contents for any computer publication.

Sure, some programs are "just for fun," but even these should justify their existence. Why play Othello on a computer when it's more comfortable to pull the board up near the fireplace? On the other hand, a computer opponent in some chess programs is a better choice than most human ones.

Mr. Kimmel's last paragraph should be required reading for all potential program authors—and their editors! Amen!—*Candy Jens, R.D. Box 201, Belmar, NJ 07719.* □

TSE·I·HARDSIDE

6 South St., Milford, NH 03055 (603) 673-5144

TOLL FREE OUT-OF-STATE 1-800-258-1790

MODEL II
64K $3499

COLOR COMPUTER
16K $399

POCKET
COMPUTER
WITH INTERFACE
$259.

MODEL III
48K $999

TRS-80 COMPUTERS

Mod I, 64K RAM (#26-4002) $3499.00	Color Comp, 4K RAM (#26-3001) ... $359.00
Mod III, 16K RAM (#26-1062) $919.00	Color Comp, 16K RAM (#26-3001+) ... $399.00
Mod III, 48K RAM (#26-1062+) $999.00	Color Comp, Ext BASIC (#26-3002) ... $529.00
Pocket Comp w/Interf (#26-3501+) ... $259.00	

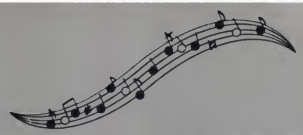
MODEL I DISK DRIVES

HARDSIDE 40-track Dr (#7-40) $319.00	PERCOM Data Sep (#7-03) $29.95
PERCOM TFD-40 Dr (#7-99) $379.00	PERCOM Doubler (#7-07) $199.95
PERCOM TFD-100 Dr (#7-100-1) $399.00	HARDSIDE Ext Cable (#7-02) $15.95
HARDSIDE 80-track Dr (#7-80) $449.00	HARDSIDE 2-Dr Cable (#7-04) $29.00
PERCOM Dual TFD-100 Dr (#7-100-2) .. $799.00	HARDSIDE 4-Dr Cable (#7-05) $39.00

MODEL I PERIPHERALS

COMM-80 Interf (#4-80) $159.00	ORCHESTRA-80 (#15-03) $79.95
CHATTERBOX Interf (#4-81) $239.00	Upper/Lower Mod Kit (#15-02) $24.95
DISK-80 Interf, 32K RAM (#4-82) $339.00	CPU Speed-up Mod kit (#15-04) $45.00
DISK-80 Interf, 32K RAM (#4-83) $369.00	Video Reverse Mod kit (#15-05) $23.95
BUSY BOX Interf (#4-01) $89.95	2-port TRS-BUS Ext (#15-12) $29.95
LYNX Communications Interf (#19-80) . $229.00	3-port TRS-BUS Ext (#15-13) $39.95
RS Expan Interf 32K RAM (#26-1140-32) $389.00	TRS-80 Model I Dust Cover Set (#16-01) . $7.95
16K Memory Kit TRS-keypad (#5-1102-1) $49.00	TRS-80 Model I Carrying Case (#17-201) $109.00
16K Memory Kit, TRS-Interf (#5-1102) .. $49.00	TRS-80 Monitor Carrying Case (#17-202) $84.00
Dual Joysticks for Color Comp (#26-3008) $24.95	CTR-80A Cass Recorder & Cable (#26-1206) $59.95
VISTA Model II 8'' Disk Dr 1 (#7-4001) . $939.00	TRS-80 Model III Dust Cover (#16-05) ... $7.95
VISTA Model II 8'' Disk Dr 3 (#7-4002) $1795.00	

TERMS: Prices and specifications are subject to change. HARDSIDE accepts VISA & MASTERCARD. Certified checks and Money Orders; Personal checks accepted (takes 3 weeks to clear). HARDSIDE Pays all shipping charges (within the 48 states) on all PREPAID orders OVER $100.00. On all orders under $100 there is a $5.00 handling charge. COD orders accepted (orders over $250 require 25% deposit) a $2.50 handling charge must be added. UPS Blue Label, and Air Freight available at extra cost. TRS-80 is a trademark of Tandy Corp.

Macromusic from Micros

A Look at the Past and Future of Music Synthesis

Laurie Spiegel

Laurie Spiegel is a Juilliard-trained composer who has worked predominantly in electronic and computer media for the past ten years. Here she answers some questions and casts some aspersions on assumptions that have been made about music synthesis or micro computers.—EBS

When people first use a new technique, they are often unable to bring out its strengths and take advantage of its unique characteristics because they limit the ways they use it to conform to their past experience. Our attempts to realize the musical potentials of microcomputers are often molded by concepts we have inherited from three of its predecessors: written instrumental music, analog synthesizers, and large mainframe computer music systems.

Micros in music are most likely to be used by people outside of the professional music world, at least at first, and to gain their first broad acceptance as a new kind of folk instrument. It will probably be some time before more than a handful of professional musicians feel that the microcomputer is a suitable instrument for their work. Since a lot of people are putting time and effort into trying to get music out of their micros at this point, it seems like a good idea to take a look at the various ways music has been done in the past and how these might be influencing our work with our micros. Part of this influence can be seen in the presence in microcomputer music systems of ideas and methods taken from predecessor musics, and part of it is visible in certain assumptions which are kept even though they are no longer valid (for example, that music can't be heard while it's being composed).

First, let's ask a few questions about what's been happening.

Laurie Spiegel, 175 Duane St., New York City, NY 10013.

Who Is the Micro-Musician?

Question Number 1: *Who is involved in microcomputer music?*

Unlike large expensive music synthesis systems, micros are most likely to be used for music by home computerists who are neither expert nor professional in either music or computer techniques, let alone in both. Of these two possible specializations, it is more likely that the micro-musician (or developer of a micro-based music system) will have a strong computer or technical background than a strong musical one. Deciding to use already-present technical skills to help fill in for musical technique would be more satisfying and sensible than abandoning musical techniques already mastered to try to achieve a rewarding musical experience with computer skills that have yet to be learned.

A trained or educated musician who decides to use computers is likely to have in mind some specific effect he wants to achieve and can't get in any traditional way. This is probably a small group compared to the growing number of computerists looking for some way to gain more personal meaning and pleasure from computer skills and equipment they already have. The strongest effort to create—and the largest demand for—microcomputer music systems is likely to come from people who have wanted to be able to do music, lacked the extensive traditional training necessary, and hope that technology will enable them to substitute the use of their intelligence and sensitivity for years of laborious acquisition of reflexes and an early start.

Ignorance May Be Bliss

Question number 2: *Is this an advantage or a disadvantage?*

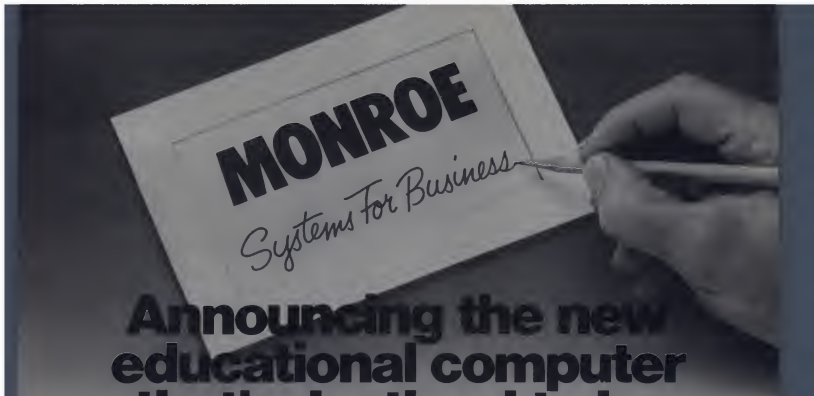
People who haven't done much music before, either with traditional musical techniques or with analog synthesizers or larger computer music systems, who are coming to music almost entirely through small computers, possess an ignorance which may lead to beneficial, new, and untried approaches, or impede their work due to lack of experience. It may be difficult to figure out whether the problems and frustrations encountered in trying to develop a system or to actually make music on it are due to problems with the system itself or to some miscomprehension of musical processes.

When you look at all those little black dots sitting on 5-line staffs or at any other way that music has been done, you're looking at just one solution to the problem of making music.

The worst pitfalls may not be the result of lack of experience or education, might not be the loss of time or the waste of effort that accompany the re-invention of the wheel. Lots of great breakthroughs have come from newcomers to various fields who are unhampered by old entrenched ideas. Worse pitfalls may result from the unquestioning implementation of previously developed techniques in new situations where they are now inappropriate or even counter-productive. Someone may easily overlook a better way to do something because old ways of doing things are taken for granted and have become habits.

Now, if you are in the advantageous position of not being a trained musician, not having all those habits and preconceptions built into you, and you want to do music on your micro, what's the first thing you think of doing? Typically, you try to find out how music has been done in the past. Then you try to simulate these methods on your micro. Typically, you don't ask "What's the most difficult or frustrating thing about how music has been done by established methods?" and then try to figure out a better way. Nor is music typically approached afresh, as though there were no existing methods, and we had to figure out the making of it from scratch.

The greatest disadvantage of education and experience is that it is habit-forming.



Announcing the new educational computer that's destined to be the head of the class!

The Monroe Educational Computer

What takes the Educational Computer to the head of the class is that so many of its "standards" wind up as costly "extras" on other microcomputers. Features like:

- 96K of system RAM including 32K of *user* RAM
- over 320,000 bytes of built-in flexible disc storage
- typewriter-style upper and lower case keyboard, 10-key numeric pad
- 8-key row of user-definable keys providing 16 additional keyboard functions
- extended BASIC language
- three serial RS232 ports for communications, printers and peripherals
- high and low resolution color graphics with color text

Monroe gives you much more than hardware. You will have access to a full-range, Monroe-developed, software library that makes this computer *so versatile, so powerful, it will serve educational needs from primary to secondary to college levels!*

With Monroe, you'll never be left alone with a computer and nowhere to go for help. The Educational Computer will be sold, leased, serviced and personally installed through Monroe's 350 branch offices nationwide.

For full details, fill out the coupon and send to Monroe Education Center.

Monroe Systems For Business
The American Road
Morris Plains, NJ 07950

Att: Monroe Education Center

Name _____
Title _____
Educational facility _____
Address _____
City _____
State _____ Zip _____

Litton **MONROE** **Systems For Business**

CIRCLE 196 ON READER SERVICE CARD

not by addiction to the acquisition of knowledge, but in the entrenchment of frames of mind, methods, attitudes which—though once productive—now prevent progress in a new situation. When you look at all those little black dots sitting on 5-line staffs or at any other way that music has been done, you're looking at just one solution to the problem of making music, and that particular solution is going to have a lot of problems inherent in it which you will be adopting right along with it if you put it into your computer.

Now look at your computer. What can it do that couldn't be done by the older musical techniques?

Questionable Preconceptions

Question number 3: *Where are the older ideas being used in microcomputer music systems coming from?*

In the current development of microcomputer-based music systems there are two main sources of questionable preconceptions, each of which may create problems. These are the two areas most likely to be studied by microcomputerists creating music. One consists of the traditional methods whereby music has been created in the non-electronic past—instrumental and pencil-and-paper music. This is a body of technique and method requiring many years of study, and easily subject to over-simplification and misunderstanding, as well as ignorance of musicians' dissatisfactions with same.

The other precedent area of study and influence consists of large computer music systems, methods and ideas concerning sound synthesis techniques, scientific versus artistic data types and processes, methods of user interaction, etc. We'll return to these predecessors of musical micros later and look at what drawbacks may be found lurking in them as models. But first a look at a third available source of preconceptions, which does have valuable ideas to offer, but is unfortunately often overlooked: analog music synthesizers.

Digital and analog thinking have unfortunately overspecialized away from each other to the point where analog and digital system design are considered almost irrelevant to each other. (How many of us know, appreciate, or have even been curious about the analog computer?) The chief characteristics of the analog music synthesizer which may be beneficial to, but are underutilized by, small digital music systems include:

1) Modularity: they are built up of separate devices each with a different dedicated function, easily reconfigurable.

2) Hybridization: the best method is used for each subtask regardless of internal consistency of design or method.

3) Parallel processing: the simultaneous as well as the sequential.

4) Parallel random access to (of) all signals, variables, controls.

5) Real-time interaction with the sound; a tight feedback loop.

6) Subtractive synthesis: carving down to rather than building up a desired sound.

7) A qualitative and relational orientation, rather than quantitive and entity-oriented.

Why Use Micros?

Question number 4: *What would be the advantages of using micros rather than older established methods to make music?*

Disadvantages of traditional instrumental and paper music:

1) People want to begin making music later in life than childhood, and music is one of very few techniques which are dependent on such lengthy study that it must be started in childhood or the boat will generally have been missed. Computers promise the subsitution of intelligence and sensitivity for coordination and reflexes.

There ought to be a range of ways to be involved in music in between the extremes of having to make every note individually yourself and being a completely passive listener.

2) Late starters don't want to have to learn, and trained composers don't want to be limited by, the traditional written notational language and its constraints. Learning notation's "alphabet" isn't too hard, but really mastering it as a means of expression is harder, time-consuming and relatively rare. Every langauge has inherent conceptual biases and embodies limitations of what can be envisioned and expressed through it. Accomplished practitioners of notation often object to its bias toward discrete rather than continuous pitch changes, its hierarchical organization of time, etc.

3) People want to work directly with sounds, rather than with symbols for them. Composers want to be able to work on the work itself, as a painter or writer does, to be able to experience the actual music, and to present it to others for communication to get feedback, instead of having to compose a set of symbolic instructions for someone else to use in realizing the actual piece. That would be similar to an artist having to write out instructions telling how to paint a particular painting, never getting to see it at all while formulating it, and then having to find someone to repaint it every time anyone wanted to look at it.

4) People want to make sounds either unmakable or indescribable by traditional means. This includes trying different intervals and scales, new timbres and instruments, certain kinds of complicated rhythms, or notes longer, faster, higher, or lower than can be played on existing instruments, etc.

5) Composers want to automate the time-consuming drudgery of such tasks as copying repetitions internal to a piece, scores and parts for players to read, and such standard musical pattern transformations as transposition, inversion, and retrograde, as well as resequencing (for example "splicing"), insertion, deletion, and other such editing operations as are cumbersome on paper and easy on computers.

6) People without instrumental performance skills want to be able to create their own renditions, performances, interpretations of standard repertoire, to "conduct" pieces themselves, changing tempo, balance, and maybe even the piece itself (notes, rhythms). There ought to be a range of ways to be involved in music in between the extremes of having to make every note individually yourself and being a completely passive listener.

7) Improvisers, often lacking adequate technique in written notation, want to be able to record their creations in a format that can be edited and altered (unlike tape).

8) Musicians of all types want to shorten the turnaround time between conception and realization, between impluse, feeling or idea, and sound.

Dissatisfactions with analog synthesizers: 1) They are expensive. 2) They are large and cumbersome. 3) They are difficult to calibrate exactly. 4) They often drift and are unsteady. 5) They have no memory. This means it's impossible to return to a specific calibration, or to store and replay a sequence of user interactions, or to store, replay or edit either a specific sound or a whole piece. All editing and recording must be done with tape, which is noisy and prohibits selective alteration of parameters or of individual component sounds. 6) The patterns of control available are both limited and simplistic (cyclic repetition, randomness, sampling) or physically difficult (keyboard control, or how many knobs can you turn at once?). 7) Unlike software routines, hardware modules are fixed in function and finite in number.

Disadvantages of large computer music systems: 1) Too expensive for private ownership. 2) Too large (not portable). 3) Generally not owned by the user, with consequent limited access. 4) Often require specialized knowledge of both traditional musical techniques and computer techniques, rather than reducing the amount of knowledge required to create music. 5) Generally one of-a-kind, not standardized like micros, so that music has to be fixed

"WITH THE UCSD p-SYSTEM,™ WE CAN WRITE ONE APPLICATION THAT GOES FROM APPLE TO ZENITH."

HARRY BLAKESLEE, President, Denver Software

Our business is bigger and better than ever.

A lot of the credit for that goes to the UCSD p-System software from SofTech Microsystems. It's given us ten times the market we used to have.

We can write a single, sophisticated applications program with the UCSD p-System—like our financial management package—and it just keeps on running. On Apple, Commodore, Ohio Scientific, Texas Instruments, Zenith, and more.

That's the real beauty of the UCSD p-System. Any program you write for one microcomputer runs on others, both today and tomorrow. You protect your software investment, without restricting your hardware options.

And with the UCSD p-System, you can use the language of your choice—UCSD Pascal,™ FORTRAN-77, BASIC, or assembly language. All are backed by SofTech Microsystems, a leading system software company who's been around for over a decade, who knows how to develop professional quality software, and who's committed to delivering it.

Get a head start on tomorrow. With the microcomputer software that goes from "A" to "Z." Distribution licensing and single copies available. Write or call for details, so you can start going places, too.

SOFTECH MICROSYSTEMS
A SUBSIDIARY OF SOFTECH

For the software that's going places.

9494 Black Mountain Road, San Diego, CA 92126. (714) 578-6105
TWX: 910-335-1594

UCSD p-System and UCSD Pascal are trademarks of the Regents of the University of California.

CIRCLE 229 ON READER SERVICE CARD

(unchangeable) on tape to be played anywhere else. 6) Because they often exist in scientific and/or data processing environments, they tend to exhibit attributes of these which may not be optimal for music (list formats for scores rather than hierachical or other structures exploiting music's internal redundancy, a bias toward pre-speciying rather than adjusting sounds ex post facto, etc.).

Other reasons for microcomputer music:

1) Microcomputer owners want to be able to make music on their computers regardless of whether it would be easier (or better music) to do the same music by another method (after all, we love our computer the way a musician loves his instrument).

2) For various reasons, people who have micros are always looking for things to do with them.

3) Music itself has suffered from the exclusion of many highly musical individuals by virtue of their lacking conventional means of creating it. The musical community has generally been smaller than those of writers, painters and other such occupations due to the elaborate technique which must be learned, the early age at which it must be begun, the non-musicality of criteria for selection of individuals able to pursue music (physical coordination and mastery of symbolic written language), and the scarcity of access to tools of production (an orchestra of 100 trained individuals in a large space, each playing a handcrafted precision instrument and reading hand-copied notation, with microphones for 24 track recording, is neither common nor cheap). Micros will hopefully reduce the exclusivity attached to older music techniques.

4) Instrumental, analog, and large-computer musics are all relatively expensive to produce, and all require access to scarce means of realization (performers, studios, equipment).

5) Computers offer a unique and as-yet-unfulfilled potential for synchronization of music with non-musical media, for which it is often created (film, TV, etc.).

6) Micros are relatively standardized and widespread and music can be swapped around on disk, tape, or modem, providing not only feedback and communication, but alternatives to the bottlenecks of established distribution media such as records and radio.

7) Because they are there.

ASSUMPTIONS & ASPERSIONS

Now that we've looked at some of the problems of each of the three most prominent predecessors of microcomputer-based music systems, let's look at some of the attributes and ideas which have appeared in music systems implemented on micros, and cast a few "aspersions" on some questionable "assumptions" which may have had suspicious origins outside of microcomputer music itself.

Musicians Can't Program

Assumption: Musicians can't program, and shouldn't have to.

Aspersion: Computer languages are probably easier to learn then the musical notational language. This prejudice results in a tendency to create large, inflexible, integrated music software systems rather than music languages consisting of libraries of single-function modules (macros or subroutines) which can be variously configured by the user via a higher level language. (Shameful in this era of structured programming!) This makes it difficult for users to customize music software to their own personal working methods and musical interests. Different people, different musical activities (composing, performing, improving), and different pieces will not all work at their best on any single fixed system.

Just as the alphabet is not necessary for verbal expression, notes are not an integral or necessary part of music.

Assumption: Conventional staff notation on microcomputers is wonderful.

Aspersion: What functions has this difficult-to-learn, difficult-to use, uneconomical, traditional musical technique served in the past? Are they still necessary functions given computer technology? Is there any better way (without the inherent limitations and problems of notation) to serve these functions on a micro than there was on paper? Visible instructions to players are unnecessary, as the computer plays the music. The user can work with the actual sounds by ear, and may not need to write them symbolically. Notation permits dealing with more material than can be held in detail in the human memory, but a tiny graphic window showing a few paltry notes is insufficient, actually a step backwards from paper. Traditional notation has been useful in designing music for dealing with relationships more complex than can be simultaneously conceived or described, but it displays only events, not relationships. Notation is no longer needed for communication of musical material in the absence of sound, as the equipment which displays the computer notation can also play the music it represents. The music can be stored and transported on disk or tape (digitally or as audio) or by modem. Most people don't read traditional notation anyway. What is your reason for implementing or using it? Might there be better ways to accomplish the same functions?

Assumption: Musicians want to know exactly what something is going to sound like before they hear it, and to be able to describe exactly, in advance, what they are going to make audible.

Aspersion: Scientists may prefer exact, quantitative description, and work best with total preconception and definition, but music generally involves a give-and-take process of real-time empirical discovery, interactive alteration of a more qualitative than quantitative nature ("Play that passage with a gentler sound" rather than "attenuate partials numbers 11, 13 and 19, by 34%."). Often composition consists in large part of recording, ex post facto, what has been "discovered" during a session at the keyboard (or console). In the past, due to the limited nature of traditional musical technology, it has been necessary to specify music in advance of hearing it if one wanted to make music beyond what one could play oneself. This has made composition a difficult art, and need no longer be the case.

Unlike scientific accoustic research, music commonly uses a "black box" technique. The instrumentalist does not need to know what the specific content of a sound is or to understand the exact mechanism of its production. Through practice in a continuous feedback situation, a musician learns how a sound will change when interaction with the means of production changes. Unlike the scientific researcher's need for exact quantified descriptions of phenomena, music makers need a clear and delicate correlation between an input and an audible response. This is a relationship of analogy, effectively implemented in analog synthesizers, as derived from conventional musical instruments and badly neglected in the non-realtime performance instruments becoming so common for micros at this time.

Digital is Better

Assumption: It is somehow better and purer to do everything digitally, within the central computer itself, no matter how small it is, avoiding hybridization, and particularly avoiding analog modules.

Aspersion: This kind of thinking advocates the implementation of software oscillation on systems with mere 1 megahertz clocks, as opposed to interfacing external oscillators which need only be updated by the computer. It means having to compute envelopes rather than merely adjusting and triggering them, requiring output of several times more information per unit of time. It means tying up most of RAM and of processor time in dedicated function generation, and severely restricting what's available for other uses (control functions, real-time users inputs, visual feedback, timbral change and variety, a greater number of voices, etc.). It works, but it means giving up a lot of other potential. This approach came down to micros from large fast computers, and probably should be left with them.

consumer computers

formerly Computers 'R' Us

We accept these major credit cards:

mail order

OPEN EVERY DAY 9 to 6 PST

California, Alaska & Foreign orders (714) 698-8088
Shipping Information or Backorders call (714) 698-0260
Service Center and for Technical Information (714) 660-6502

TELEX 695-000 ANS:BETA REF:CCMO

ORDER TOLL FREE

800-854-6654

apple computer

Authorized Dealer

ALL EQUIPMENT IS FCC APPROVED

APPLE II PLUS 16K 1049
APPLE II PLUS 48K
(APPLE Memory) 1189
APPLE II Standard Models . . . CALL
DISK II DRIVE & CONTROLLER . 529

This model includes DOS 3.3 16 sector

TOP FIVE SELLERS

Language System W/Pascal	425
Silentype Printer W/Interface	549
Hayes Micromodem II	319
Videx Videoterm 80 w/graphics	335
Z-80 Microsoft Card	299

APPLE COMPUTER INC.

Disk II Drive Only	445
Integer or Applesoft II Firmware Card	155
Graphics Tablet	649
Parallel Printer Interface Card	155
Hi-Speed Serial Interface Card	155
Smarterm 80 Column Video Card	335

MOUNTAIN COMPUTER INC.

Music System (16 Voices)	479
A/D + D/A Interface	319
Expansion Chassis	555
Inroll/+ 1D System	249
Clock/Calendar Card	229
Supertaller SD-200	249
Romplus+ Card	135
Romwriter Card	135

CALIFORNIA COMPUTER SYSTEMS

Clock/Calendar Module	109
GPIB IEEE-488 Card	259
Asynchronous Serial Interface Card	129
Cersinonics Parallel Interface Card	99

We carry all CCS hardware. Please call

MISC. APPLE HARDWARE

16K Ram Card Microsoft	189
ABT Numberic Keypad(add or new hybrd)	113
ALF 3 Voice Music Card	229
Alpha Syntauri Keyboard System	1399
Corvus 10MD Hard Disk	CALL
Lazer Lower Case Plus	30
Micro-Sci Disk Drives	CALL
SSM A/D Serial/Parallel Card AGT	189
Sup-R-Terminal 80 Col Card	339
SVA 8 inch Floppy Disk Controller	345
Versawriter Digitizer Pad	229

WE HAVE MANY MORE ACCESORIES FOR THE APPLE II IN STOCK—PLEASE CALL OR WRITE FOR A PRICE LIST.

ATARI

MODEL 800 16K $799

Atari 4DD 16K	499
81D Disk Drive	499
41D Program Recorder	69
850 Interface Module	175
822 Thermal Printer (4D col)	369
825 Printer (8D col)	795
Atari 16K Ram Module	155
Atari Light Pen	65

We stock all Atari accessories & software, please call for more info.

PRINTERS

Anadex DP-9500 W/2k Buffer	1375
Anadex DP-9501 W/2K Buffer	1450
C. Itoh Starwriter 25 CPS	1750
C. Itoh Starwriter 45 CPS	2450
Centronics 737	825
Epson MX-70 W/Graphics	449
Epson MX-80 132 Col	620
Paper Tiger IDS-445 W/Dot Plot	749
Paper Tiger IDS-460 W/Dot Plot	1195
Paper Tiger IDS-560 W/Dot Plot	1495
Qume Sprint 3/45 Daisywheel	2550
Silentype w/interface for Apple II	549
Watanabe Digiplot	1295

VIDEO MONITORS

Amdek/Leedex Video-100 12" B&W	139
Hitachi 13" Color	389
NEC 12" P31 Green Phosphor	CALL
Panacolor 1D" Color	375
Sanyo 9" B&W	179
Sanyo 12" B&W	255
Sanyo 12" P31 Green Phosphor	295
Sanyo 13" Color	445

OHIO SCIENTIFIC

Challenger 4P	699
C4PMF (Mini Floppy System)	1599
CIP Model II	449
Sargon II (Disk or Cassette)	35
Fig Forth (Disk Only)	69

APPLE SOFTWARE

DOS Toolkit	65
Applesoft	60
Tax Planner	99
Apple Writer	65
Apple Pass	45
D.J. Portfolio Evaluator	45
D.J. News & Quotes Reporter	65
Apple Fortran	165
Apple Pilot	129
DOS 3.3 Upgrade	49
Music Theory	45
The Controller Bus. Sys	519

MISC. APPLICATIONS PACKAGES

Visicalc	125
Desktop Plan II	169
CCA Data Management DMS	85
Easywriter Word Processor	225
ASCII Express	65
Super Text II	139
Programmo Apple Pie	119
The Landlord Apt. Mgmt. Pkg	649
Peachtree Business Software	CALL
Tax Preparer by Howardsoft	89
Applebug Assem/Dissasm/Editor	75
3-D Graphics by Bill Budge	53

GAMES

Flight Simulator	34
The Wizard and The Princess	32
Cosmos Mission (Space Invaders)	24
Sargon II Chess	32
Hi-Res Football	39
Adventure by Microsoft	27
Phantoms Five	39
Reversal (Othello)	34

PLEASE CALL OR WRITE FOR A COMPLETE SOFTWARE LIST

ORDERING INFORMATION Phone Orders invited using VISA MASTERCARD AMERICAN EXPRESS DINERS CLUB CARTE BLANCHE or bank wire transfer Credit cards subject to service charge. 2% for VISA & MC. 5% for AE, DC & CB Mail Orders may send credit card account number (include expiration date), cashiers or certified check money order or personal check (allow 10 days to clear) Please include a telephone number with all orders Foreign orders (excluding Military PO's) add 10% for shipping all funds must be in U.S. dollars. Shipping handling and insurance in U.S. add 3% (minimum $4.00). California residents add 6% sales tax We accept COD's under $500. OEM's, Institutions & Corporations please send for written quotation All equipment is subject to price change and availability without notice All equipment is new and complete with manufacturer warranty (usually 90 days) We cannot guarantee merchantability of any products We ship most orders within 2 days.

WE ARE A MEMBER OF THE BETTER BUSINESS BUREAU AND THE CHAMBER OF COMMERCE

SHOWROOM PRICES MAY DIFFER FROM MAIL ORDER PRICES.

PLEASE SEND ORDERS TO:

CONSUMER COMPUTERS MAIL ORDER 8314 PARKWAY DRIVE, GROSSMONT SHOPPING CENTER NORTH LA MESA CALIF. 92041

CIRCLE 140 ON READER SERVICE CARD

Macromusic, continued...

Conceiving of analog processes and hybrid systems as mere compromise stop gaps to be avoided if at all possible, misses three points. First, hybridization results from the selection of the most efficient method and components for the specific task. This involves (at least conceptually) breaking down or modularizing the complete process to be implemented, and then implementing each stage the best way. Second, hybridization (modularization), typical of such tasks as oscillation, filtration, or attenuation, is often a form of parallel processing. Parallelization is an extremely important technique for optimizing many kinds of systems. Music, a highly parallelistic phenomenon (much simultaneous activity, voices, parameters, inputs, etc.), is likely to benefit from relatively high modularity and hybridization. Third, music (an end) and system design (a means) are somehow found to be in competition as vehicles of aesthetic expression. It is important to keep in mind that no matter how wonderful and aesthetically pleasing the internal construction and integrity of a computer system are, it has missed the boat unless its intended application benefits from its having been done. If you're actually thinking about music, the fast and dirty kluge that works is easily preferable to the elegant system that just doesn't quite.

Assumption: Recreating the sounds of traditional acoustic instruments is one of the first things computers should do.

Aspersion: A better study of timbre than analysis of conventional instrument sounds with a goal of resynthesizing them, would be the study of how the orchestral composer's use of timbral variation correlates with the subjective effect that is to be created. Probably in the long run, it will be more economical to program a few basic principles of how timbre is used and changed under certain circumstances and for certain effects than to store and assemble all the data necessary to recreate the tools of an earlier practice. Orchestration is not the ability to create certain specific sounds but the study and practice of using blends, contrasts, and sonic densities to create mood, drama, and other effects. On small microcomputers, it makes sense whenever possible to substitute a concise algorithm for part of the massive data base representing a full orchestral palette.

Music Is Just Notes

Assumption: Music is made up of notes.

Aspersion: Here we find a common unnecessary assumption implied by both large-computer music and (upon superficial study) traditional musical technique. It may seem obvious, but it's a little like saying that novels are made up of letters of the alphabet. It's not untrue, but it kind of misses the point—the words, sentences, ideas, characters, and plot. Traditional music scores are composed by building up a total work out of many specific event descriptions, a function of existing, primitive musical technology (or "technique"). Musical "words, phrases, and sentences" are immediately conveyed when music is played on instruments. The little marks called "notes" in which these larger ideas are transcribed are slightly faster to put down on paper than alphabetical letters, and capture a lot less information than is actually in the sound they partially represent. Composers (performers, improvisers, etc.) don't start with or think on the level of notes, but are concerned with patterns such as themes—motives, chord progressions, phrases—musical modules designed for ease of extension and interrelation—which are spelled in notes.

It is only the ways in which electronic generation of music differs from established musical methods that will have real or lasting value.

In the same way that the early stages of learning to write sentences are concerned with manipulation of the alphabet, the early stages of learning to make music are traditionally concerned with notes. Just as the alphabet is not necessary for verbal expression, though, notes are not an integral or necessary part of music. Musical sounds can be continuous instead of discrete, for example. Notes are also conceptually similar to describing a waveshape by symbolically representing each sinusoidal component. What is first imagined and then heard is not a bunch of pitch-amplitude pairs, but a single "gestalt" timbre with a particular subjective quality.

So if music doesn't consist of individual notes any more than tone quality (timbre) consists of sine waves or books consist of letters, what does music consist of? Music, as subjectively perceived, has never been objectively distinguishable from non-music. Music and timbre consist not of events or entities, but of patterns, relationships, systems, complexes, and configurations, which vary qualitatively according to principles which have yet to be understood. The definitions of these principles will have to be found by studying the ways in which our perceptual and cognitive systems interact with the acoustically encoded patterns of information which so mysteriously affect us as music.

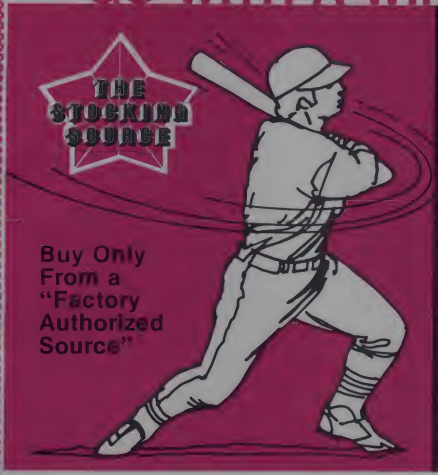
Some of the more familiar patterns used in music include rhythms, melodies, motives, themes, chords, sequences, ornaments, sonatas, rondos, etc. But music also consists of processes, transformations of these musical patterns, including such common ones as transposition, inversion, repetition, variation, initiation, substitution, superimposition, interpolation, augmentation, diminution, etc., and large-scale processes such as canon and fugue.

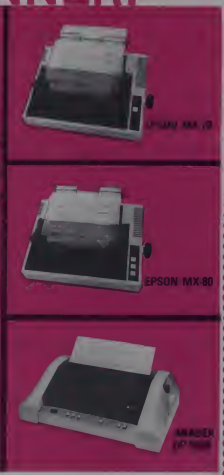
This is a lot to deal with. Fortunately, a wonderful tool has arrived to provide a quantum leap for dealing with the complexities of music, a tool beyond anything that has ever existed before (outside of the mind itself) for manipulating patterns of information and for implementing processes. Unfortunately, this is not often or sufficiently apparent from microcomputer music system designs, largely because a lot of people do assume that music is made up of notes. To the extent that the music system user is required to be concered with notes, with specific parametric values of each sub-event and each of its accoustic components, it becomes that much more difficult to focus on musical patterns and on processes of interrelating them, let alone to maintain focus on large-scale musical architecture and evolution, emotional expression, or other musical concerns. One reason that there have been few great composers is that few minds are able to transcend all that musical detail to maintain adequate focus on large-scale patterning. Computers should be making it easier, not harder, to do so.

Sound is not music. Even organized sound (rivet guns, lawnmovers) is not music. Particular patterns of organization are music. The patterns in question are those from which the human perceptual system is able to derive meaning. The focus of computer music systems, unprecedented instruments for the manipulation of patterns of information and processes, should be finding the best relationships between patterns in the sound they generate and patterns from which our cognitive and perceptual systems are able to interpret meaning. It is both unmusical and a waste of potential of the computer to deal with music as a non-patterned collection of individual events, separately described one by one.

The achievement of already-established musical phenomena and methods (staff notation, instrumental timbre resynthesis, etc.) may be impressive technical accomplishments, but they hold no particular value for music itself. It is only the ways in which electronic generation of music differs from established musical methods that will have real or lasting value. The value of such differences will not be so much in the creation of radically new and different music, but of better ways of creating music as powerful as the best music that's been created in the past by other means. This can only be done with better understanding of how such music has been made, how it affects us, and of what insufficient techniques and premises have prevented its being so well made more often and by more people. □

GO WITH A WINNER!





PRINTERS

	List Price	Your Cost
NEW — Okidata Microline 82	$ 799.	$459 Our Price

Features: 80 C.P.S.; Bidirectional; Full forms Control; Choice of Parallel or Serial Interface as Standard; Buffered Serial Optional

	List Price	Your Cost
Epson Model MX-70	$ 449.	Ask For Our Price

Features: 80 C.P.S.; Unidirectional; Bit Plot Graphics; Adjustable Sprocket from 4" — 10"

	List Price	Your Cost
Epson Model MX-80	$ 645.	Ask For Our Price
Okidata Microline 80	$ 599.	$450 Our Price
Okidata Microline 83	$1260.	Ask For Our Price
Anadex DP-9500 & DP-9501	$1650.	Ask For Our Price
Anadex DP-9000	$1550.	Ask For Our Price

INTERFACES —

Epson Apple Plug-in Interface & Cable	$110.
Epson Serial Interface & Cable	$ 90.
Epson IEEE 488 Interface & Cable	$ 80.
Model TRS-80 Expansion Interface Cable	$ 35.
Model 232 Universal Serial Interface Cable	$ 25.

NEW — Epson Hi Res Bit Plot Graphics

E-Proms	$60./set
Okidata Microline 80 Tractor	$ 50.
Okidata Microline 80 RS-232 Interface with 256 Character Buffer	$160.

NEW LINES **CENTRONICS PRINTERS** — The complete line Model 737 Letter Quality Printer with True Lower Decenders, Friction & Sprocket Feed, Bi-Dir. Paper Drive.

NEC PRINTERS — Spinwriters and Trimliners fully formed character printers, Thimble and Band.

VISA

ASK FOR OUR INSTANT DISCOUNT From Roy Hawthorne Talk To Bill Tokar On Applications

CALL TOLL FREE
U.S.A.
1-800-521-2764
MICHIGAN
1-800-482-8393

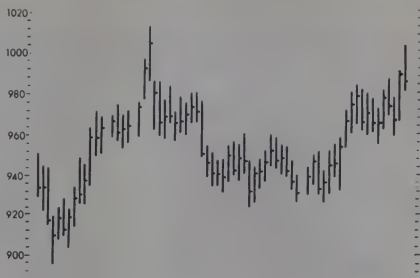
Reminder:
We are open
8:30 AM to 5:00 PM EST
Monday through Friday

WRITE TO:
"The Stocking Source"
24069 Research Drive
Farmington Hills, MI 48024
313-474-6708

CIRCLE 264 ON READER SERVICE CARD

Six Programs for the Investor

Linda Barkaszi



Personal Investment Analysis by computer has enjoyed a recent surge in popularity. This article discusses six packages currently available for Apple and TRS-80 computers for under $200. Brief definitions of terms specific to stock trading are included for beginners.

Calcugram CF Stock Option Program
The Calcugram Co.
P.O. Box 3037, Walnut Creek, CA 94598
TRS-80 16K cassette, $150

The *Calcugram CF Program* is a very effective and versatile analysis tool for evaluating combinations of stock option contracts. Black and Scholes' price model is used to determine "fair" option values, given stock volatility. Volatility is a statistical measure of the tendency of a stock to fluctuate based on its price history for the previous year. The volatility percentage of a stock can be a useful theoretical indication of how widely its price is likely to fluctuate—an important consideration for many option strategies. Writers of combinations or straddles look for underlying stocks that are expected to trade within a narrow price range, while buyers of combinations or straddles look for stocks that are expected to move sharply up or down. Stocks with high volatility percentages are expected to fluctuate in price more widely than stocks with low volatility. A volatility of 22% is average for options.

Market trend is also important because it influences the movement of option stocks. If the market is weak, the investor should be looking for a long put candidate. If the market is strong, he should look for best calls. In determining the trend of the market, he looks for extremities in sentiment, momentum, cash level, and monetary indicators, for when they occur, a change in market trend can be anticipated.

In the CF program, the present value is the starting point at which an "implied" volatility is given for the stock option. Since this implied volatility sometimes differs from the volatility of the stock, the deviation is used to determine the "expensiveness" of individual options.

Once CLOAD and RUN commands have been entered, the user is asked to enter the name of the stock, the price and the date, and the prevailing interest rate. Interest rates should not be overlooked since they influence the movement of stock options.

The program then asks for the number of different options, whether put or call, days to expiration, strike price and option price. Based on this input, computations are done which result in the implied volatility and the P%. P% is projected gain in the position versus the stock price over a range of +/- 30% of the present stock price and of the price at any selected future date. If an investor is pursuing an intelligent strategy in the option market, completion of the trade should be done before the expiration date draws near.

Market trend is also important because it influences the movement of option stocks.

The program then asks the user to input the predicted values of the options at any stock price and at any future date. Upon request, a gain/loss graph is displayed.

Option values and gains in the hedges for 13 different stock prices at 5% intervals are then displayed. If the profit range proves unsatisfactory, the graph can be erased with one keystroke. The menu is then displayed. From this menu, the user can input new ratios or a new future time or print a graph, a gain or option table, opening commission, or net profit. (Since commission costs can sometimes convert a profit to a loss, they should not be overlooked.)

The line printer will record the date, current interest rate, stock name, stock price, and implied volatiltiy for each option. A table of projected values of options over the +/- 30% range can be reproduced on the lineprinter.

Cyber-Tech Stock Valuation Model
Cyber-Tech
P.O. Box 924, Chatsworth, CA 91311
TRS-80 and Apple II with ROM Applesoft
32K disk, $29.95

Any investment decision implies a forecast of future events. However, in the case of common stocks, forecasting future stock prices, earnings, and dividends is exceedingly difficult. Unlike bond interest and preferred dividends, common stock dividends and earnings of most companies have been increasing year after year. Analysts expect this growth to continue in the foreseeable future at approximately the same rate as the Gross National Product (GNP).

The price of a share of common stock depends upon the cash flow investors expect to receive if they purchase the stock, and the probability of receiving it. The expected cash flow consists of two elements: dividends and sale price. It includes the return of the original investment plus a capital gain (or, in some instances, minus a capital loss).

The *Cyber-Tech Stock Valuation Model* uses the concept of Modern Portfolio Management by first discounting the expected earnings stream to determine the time value of money. In essence, it is the present value of expected net cashflows, discounted at the cost of capital, less the initial cash outlay. Then the internal rate of return, which is the interest rate which equates the present value of expected future cash flow with the initial

OSI SOFTWARE FOR OSI OSI

A JOURNAL FOR OSI USERS!!

The Aardvark Journal is a bimonthly tutorial for OSI users. It features programs customized for OSI and has run articles like these:

1) Using String Variables.

2) High Speed Basic On An OSI.

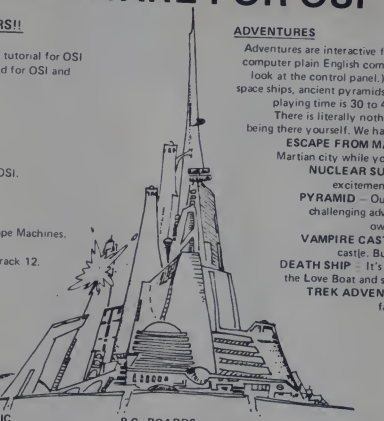
3) Hooking a Cheap Printer To An OSI.

4) An OSI Disk Primer.

5) A Word Processor For Disk Or Tape Machines.

6) Moving The Disk Directory Off Track 12.

First year issues already available! $9.00 per year (6 issues)



ADVENTURES

Adventures are interactive fantasies where you give the computer plain English commands (i.e. take the sword, look at the control panel.) as you explore alien cities, space ships, ancient pyramids and sunken subs. Average playing time is 30 to 40 hours in several sessions. There is literally nothing else like them — except being there yourself. We have six adventures available.

ESCAPE FROM MARS — Explore an ancient Martian city while you prepare for your escape.

NUCLEAR SUBMARINE — Fast moving excitement at the bottom of the sea.

PYRAMID — Our most advanced and most challenging adventure. Takes place in our own special ancient pyramid.

VAMPIRE CASTLE — A day in old Drac's castle. But it's getting dark outside.

DEATH SHIP — It's a cruise ship — but it ain't the Love Boat and survival is far from certain.

TREK ADVENTURE — Takes place on a familiar starship. Almost as good as being there.

NEW SUPPORT ROMS FOR BASIC IN ROM MACHINES

C1S — for the C1P only, this ROM adds full screen edit functions (insert, delete, change characters in a basic line). Software selectable scroll windows, two instant screen clears (scroll window only and full screen), software chose of OSI or standard keyboard format, Bell support, 600 Baud cassette support, and a few other features. It plugs in in place of the OSI ROM. NOTE: this ROM also supports video conversions for 24, 32, 48 or 64 characters per line. Replaces video swap tape on C1P model 2. All that and it sells for a measly $39.95.

C1E/C2E for C1/C2/C4/C8 Basic in ROM machines. This ROM adds full screen editing, soft ware selectable scroll windows, keyboard correction (software selectable), and contains an extended machine code monitor. It has breakpoint utilities, machine code load and save, block memory move and hex dump utilities. A must for the machine code programmer replaces OSI support ROM. Requires installation of additional chip when installed in a C2 or C4. C1 installation requires only a jumper move. Specify system $59.95.

DISK UTILITIES

SUPER COPY — Single Disk Copier

This copy program makes multiple copies, copies track zero, and copies all the tracks that your memory can hold at one time — up to 12 tracks at a pass. It's almost as fast as dual disk copying. $15.95

MAXIPROSS (WORD PROCESSOR) 65D polled keyboard only — has global and line edit, right and left margin justification, imbedded margin commands, choice of single, double or triple spacing, file access capabilities and all the features of a major word processor — and it's only $39.95.

P.C. BOARDS

MEMORY BOARDS!! — for the C1P, — and they contain parallel ports!

Aardvark's new memory board supports 8K of 2114's and has provision for a PIA to give a parallel ports! It sells as a bare board for $29.95. When assembled, the board plugs into the expansion connector on the 600 board. Available now!

PROM BURNER FOR THE C1P — Burns single supply 2716's Bare board — $24.95.

MOTHER BOARD — Expand your expansion connector from one to five connectors or use it to adapt our C1P boards to your C4/8P. - $14.95.

ARCADE AND VIDEO GAMES

GALAXIA one of the fastest and finest arcade games ever written for the OSI, this one features rows of evasive, hardhitting, dogfighting aliens thirsty for your blood. For those who loved (and tired of) Alien Invaders. — P.S. The price is a giveaway. SPECIFY SYSTEM!

Cassette $9.95 — Disk $12.95

TIME TREK (8K) — real time Startrek action. See your torpedoes move across the screen! Real graphics — no more scrolling displays. $9.95

INTERCEPTOR C1P ONLY! An all machine code program as fast and smooth as the arcades. You use your interceptor to protect your cities from hordes of enemy invaders. A pair of automatic cannons help out, but the action speeds up with each wave of incoming ships. The fastest and most exciting C1P game yet.

C1P Cassette $19.95

MINOS — A game with amazing 3D graphics. You see a maze from the top, the screen blanks, and then you are in the maze at ground level, finding your way through on foot. Realistic enough to cause claustrophobia. — $12.95

SINGLE STEPPER / MONITOR

This is probably the finest debugging tool for machine code ever offered for OSI systems. Its' trace function allows you to single step through a machine code program while it continuously displays the A, X, Y and status registers and the program and stack pointers. You can change any of the registers or pointers or any memory location at any time under program control. It takes well under 1k and can be relocated anywhere in free memory. It is a fine tool for all systems — and the best news of all is the extremely low price we put on it. — Tape $19.95 — Disk $24.95

FOR DISK SYSTEMS (65D, polled keyboard and standard video only)

SUPERDISK, Contains a basic text editor with functions similar to the above programs and also contains a renumberer, variable table maker, search and new BEXEC* programs The BEXEC* provides a directory, create, delete, and change utilities on one track and is worth having by itself. — $24.95 on 5" disk - $26.95 on 8"

AARDVARK IS NOW AN OSI DEALER!

Now you can buy from people who can support your machine.

— THIS MONTH'S SPECIALS —

Superboard II	$279
C1P Model II	429
C4P	749
8K 610 board for C1P	269
Epson MX-80 printer with RS232 installed	595

and we'll include a free Text Editor Tape with each machine!

True 32X32 Video Mod Plans for C1P (4 Chips $3.00 Crystal Required) $7.95

This is only a partial listing of what we have to offer. We now offer over 100 programs, data sheets, ROMS, and boards for OSI systems. Our $1.00 catalog lists it all and contains free program listings and programming hints to boot.

OSI

MAY 1981

Aardvark Technical Services • 1690 Bolton • Walled Lake, MI 48088

(313) 669-3110

77

OSI

CIRCLE 102 ON READER SERVICE CARD

Six Programs, continued...

cost of the stock, is found. The Cyber-Tech model identifies attractive stocks as those which have the highest rate of return in each classification.

Once the cashflows are discounted and the Internal Rate of Return is found, a Security Market Line is set up, using the 15-week Treasury Bill as the risk-free rate. The Security Market Line shows the relationship between risk and return in a market. It shifts over time depending on the changes in the riskless rate of interest.

Each stock has, as an input, a risk classification (beta) based upon its expected sensitivity. Beta, which is explained thoroughly in the instruction manual, is a measure of systematic risk and is used in assigning risk classifications. Using Beta as a risk classification, the Internal Rate of Return is compared to the appropriate point on the Security Market Line. If the Internal Rate of Return is greater then the Security Market Line, an undervalued stock is identified.

The Cyber-Tech model utilizes another exciting feature: the concept of Marginal Utility Theory, or the realization that different individuals have different degrees of risk aversion and therefore have different indifference curves. The tangency point between an individual indifference curve and the Security Market Line will occur at different points because of individual preferences. The individual must determine how much risk to take in order to increase his expected return.

The program allows the user to save input and output data with automatic file naming. Printing of either input or output data can be done using either a 40- or 80-column printer. An allowance for other types of printers can be made by restructuring the program so that the printer can be used on-line full time to obtain the necessary print-outs. Complete instructions are included in the manual.

One last feature: the Cyber-Tech stock evaluation model, when used as an investment tool, is tax deductible.

Stock Market Utility Program
H&H Scientific
13507 Pendleton St., Oxon Hill, MD 20022
Apple II 48K ROM Applesoft, Disk $59.95

Stock Market Utility Program, by H&H Scientific, is a set of four menu-driven programs: STK. 1, Data Corrector, EVAL, and MICROQ.

STK. 1 allows the user to enter the stock data. Data is entered chronologically, since the results are plotted on a first-in-first-out basis. Data can be either added or deleted in this section. Deleting a stock only removes its name from the list of stocks that is automatically updated. It does not *delete* the data file on that stock.

The Historical Stock data option in STK. 1 provides an independent means for building single data files. STK. 1 also gives the user the option to reduce files to 260 entries. Since EVAL can accept 300 entries, the maximum number that can be plotted is 280. It rewrites all stock files to the 260 most recent entries.

Data Corrector is used to correct and rewrite stock data files. You can also add or delete data elements as well as correcting another disk.

EVAL provides a comparative evaluation of stock performance. This includes simultaneous graphical display of momentum, final price, and the normalized ratio of stock price to the NYSE index average. In this program high-resolution graphics routines provide automatic vertical and horizontal scaling of the display.

MICROQ is used to build historical data files by converting stock price data obtained from CompuServe's Microquote Financial data base. The price option gives the date, volume, high/ask, low/bid and close on a daily, weekly, or monthly basis.

MICROQ requires the user to provide a means for downloading Microquote data into RAM and carrying out line-editing prior to writing to a disk file. *Data Capture 3.0*, available from Southeastern Software, fills this requirement.

In order to evaluate this package, the user must consider the cost of the two supplementary packages, *Data Capture 3.0* and access to CompuServe's Microquote, in addition to $59.95 for the software.

Stockpak System
Available from Radio Shack
TRS-80 32K with Two Disk Drives, $49.95
80- or 132- Column Printer (optional)

The basic Stockpak package is sold exclusively at Radio Shack stores. The Data Update Service can be obtained from Standard and Poor's. The Data Base Service sells for $200 a year and entitles subscribers to monthly updates on disk and an Investor's Newsletter prepared by Standard and Poor's professional staff. The newsletter describes various investment and portfolio strategies as well as useful advice on how to increase the performance of the Stockpak system. Standard and Poor's also provides subscribers with a Stockpak News Display which appears on the Data Base diskette. The News Display includes timely financial and economic news as well as various key market indicators. The package is useful and comprehensive.

Features of Stockpak include:

1. The ability to build and manage a portfolio consisting of up to one hundred securities with as many as 30 transactions on each security.

2. Eight pre-defined reports which analyze the portfolio.

3. Flexible analysis of the monthly updated Stockpak Common Stock Data Base which contains information on nine hundred companies.

4. The ability to define up to 100 additional items to further analyze each company, as well as over 70 pre-defined calculations and choice financial information on each Stockpak company.

5. The ability to define and format reports using the video screen or printer in any grouping or sequence.

The Portfolio Management System is designed to assist users in:

1. Preparation of tax returns.
2. Tracking dividend Payments
3. Analyzing portfolio performance.
4. Identifying dates that issues become eligible for long-term capital gain.
5. Comparing the performance of a portfolio to stocks in the Stockpak data base.
6. Building, maintaining and analyzing a portfolio consisting of up to one hundred securities with as many as 30 transactions on each, and maintaining of buy and sell transactions, stock and cash dividends, and stock splits.

ANA 1
Galaxy
Dept. LP2, P.O. Box 22012,
San Diego, CA 92122
Apple II with ROM APPLESOFT
48K Disk, $49.95

ANA 1 Stock Market Analysis Program by Galaxy is one of the better stock analysis programs on the market for the Apple II. ANA 1 performs rigorous analysis on the Dow Jones Industrial Average for from six months to five years. The user can choose from up to five colors to show the relationships between a least-squares linear fit, moving averages, and filters for time, magnitude or percent changes. As many color graphs as desired can be plotted on the screen or cleared at any time.

Section 1.0 of the manual is reserved for the user. Step-by-step instructions show the command prompts with their corresponding responses underlined. Each command and its function is clearly defined. ANA 1 provides 30 two-letter commands. For example, the DL (draw line) command draws a trend line on the data. If the data is above the line, you hold. If it is below the line, you sell. The MA (moving average) command allows the user to select a moving average in order to smooth out the values of the data. This command is also used for buy/sell signals.

The user can switch between text and graphic data at any time, and change the color of the next graph whenever desired.

TRS-80 sensational software

creative computing software

Stock & Options Analysis

Cassette CS-3306 (16K), $99.95
Disk CS-3801 (32K), $99.95

Should you hedge, buy, or sell out? **Stock and Options Analysis** puts a securities advisor in your computer, providing you with four powerful investment tools. **Option** gives important indices for opening and closing call option transactions. **Ograph** presents a graph or table of profit for any combination of long or short calls, puts, and stocks. This allows the detailed evaluation of three types of hedges. **Newprem** helps predict the future premiums of an option at any desired time and future stock price. **Portval** lets the computer do the paper work, providing full portfolio services, including value per share, current value, and capital gain. The program includes the effects of commissions, margin interest and dividends. Beyond helping to organize and evaluate your present portfolio, **Stock and Options Analysis** is an excellent aid for planning and testing future strategies. The comprehensive 24-page manual with this package not only shows how the programs work, but is also a primer on the strategy of hedging listed options against common stocks. This strategy has been repeatedly shown to actually be more conservative and more consistently profitable than straight buying and selling of stocks.

Solar Energy Analysis

Cassette CS-3307 (16K), $49.95
Disk CS-3602 (32K) $99.95

Available 7/81

F-Chart Solar Energy Analysis eliminates many of the tedious calculations required when designing solar-heating systems. Beyond providing a thermal analysis, the program allows designers to quickly determine the effects of changing any specifications, allowing fast, accurate, and inexpensive experimentation.

Systems using air, liquid, or domestic hot water in any climate can be analyzed in detail. The program expands the traditional F-Chart procedure by taking ground-water temperature into account and allowing for mixing valves in domestic hot water systems. **F-Chart Solar Energy Analysis** quickly pays for itself by freeing you from time-consuming calculations.

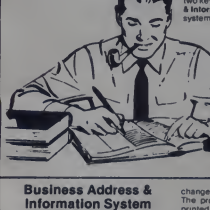
The disk version of the program includes a data base of all necessary climatic data for any location in the United States. These data are in the printed booklet included with the cassette version but must be entered manually for your geographic location.

Personal Address and Information System

Disk CS-3509 (32K) $24.95

Is your address book beginning to resemble a heavily-edited inkblot? Do your friends keep moving, forcing you to cross out and rewrite addresses and phone numbers? Let the **Personal Address & Information System** turn tiling drudgery into computing pleasure. You can store all the crucial information, including name, address, home and work phone numbers, spouse's name, and comments or remarks. At any time, the information can be edited or changed.

And there's more. Names can be sorted in alphabetical order. Entire entries can be printed, as well as mailing labels. Names can be searched for by first letter. In a 32K system, you can search any record for up to two key phrases, turning **Personal Address & Information System** into a versatile tiling system with unlimited uses.



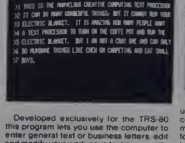
Available 7/81

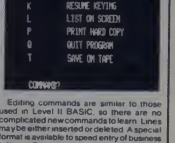
Text Processing

Cassette CS-3302 (16K) $14.95

CS-3504 Disk (32K) $24.95
(Disk includes Checking Account, CS-3304)

This program turns a 16K, TRS-80 and lineprinter into a line oriented text-processing system.


1) THIS IS THE MARVELOUS CREATIVE COMPUTING TEXT PROCESSOR
2) IT CAN DO MANY WONDERFUL THINGS, BUT IT CANNOT RUN YOUR
3) ELECTRIC BLANKET. IT IS AMAZING HOW MANY PEOPLE DON'T
4) A TEXT PROCESSOR TO TURN ON THE COFFEE POT AND HEAT THE
5) ELECTRIC BLANKET. BUT I DO HAVE A CLOCK AND CAN DUPLY
6) SO MEANING, DOUBLE LINE CHECK OF COMPUTING AND CAT SMALL
17 BOYS.



Developed exclusively for the TRS-80 this program lets you use the computer to enter general text or business letters, edit and modify your work, save text on cassette tapes, and print out a perfect report, document, or letter every time.

Editing commands are similar to those used in Level II BASIC, so there are no complicated new commands to learn. Lines may be either inserted or deleted. A special format is available to speed entry of business letters. Final printout can be done in numbered pages and you may print multiple copies.

Business Address & Information System

Disk CS-3510 (48K) $24.95 Available 7/81

Do you need quick access to business contacts and customers? Put more organization in your organization with the **Business Address & Information System**. A complete file containing company name, address, phone number, and comments can be quickly entered and stored. Information can be changed or edited whenever necessary. The program allows entire entries to be printed, and can also generate mailing labels.

When you need information fast, you can search for specific names or find all entries that contain one or two key phrases. Any key phrases can be used. **Business Address & Information System** will help you make the most of your time, putting the routine work in the computer where it belongs.

Order Today

To order any of these software packages send payment plus $2.00 postage and handling per order to Creative Computing, Morris Plains, NJ 07950. Visa, MasterCard and American Express orders may be called in toll-free.

Order today at no risk. If you are not completely satisfied your money will be promptly and courteously refunded.

Creative Computing Software
Morris Plains, NJ 07950
Toll-free 800-631-8112
In NJ 201-540-0445

creative computing software

Six Programs, continued...

Section 2.0 of the manual defines the use of each command. The Data Update Program is outlined in Section 3.0. This program allows the user to add, replace, or read entries on the Dow Jones Weekly file.

Section 4.0 describes memory allocation, disk data, internal representations of the data, transformation values, graphics routines, debugging aids, and implementation of user routines.

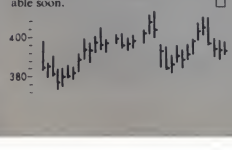
Stock and Options Analysis
Creative Computing
P.O. Box 789-M, Morristown, NJ 07960
TRS-80 32K Disk or Cassette, $99.95

This set of four programs provides both utilities for the investor and instructional material for the beginner. The author clearly explains the concepts behind the programs and the logic involved in pursuing recommended strategies. *Opgraph* provides tables and graphs of profit versus stock price at the expiration of an option. The user can specify a range of values, as well as minimum and maximum profit to be displayed. The graph or table can be sent to either the screen or a printer. The instructions explain how to use this program to develop combined strategies that have a good chance of yielding a profit.

Option, again using graphs or tables, shows profit from any combination of opening and closing transactions. The program can be used to help discover the best hedge. Again, the instructions explain hedging techniques and how they relate to the data provided by the program. *Newprem* starts by allowing the user to construct a data base of option premium data. The program can then display predicted premiums for any future time and stock price. The manual explains the important concepts, including intrinsic value and time value of an option, as well as discussing the theory behind the algorithms used by the program.

Portval is designed to aid in record keeping, both to help investors keep track of their portfolios and to help organize information required by the IRS. The program keeps track of cost, value, and gain for stocks and options. Separate track is kept of long and short stocks and options, and total value, debits, and equity are displayed at the end of the table.

With sample data, and extensive instructions, *Stock and Option Analysis* can be used by investors at any level. An Apple version of the program will be available soon. □



The most complex computer circuit can be explained with just nine cents

Common Cents

The "penny switch." It sounds strange. But it's not.

Joe Weisbecker, the designer of the RCA 1802 microcomputer, was trying to explain to some children just how a computer works. He wasn't having much success.

Computers Aren't Magic

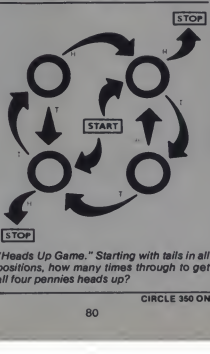
Joe's hobby is magic. He thought, "maybe I can use some kind of illusion to show how a computer works." But he didn't really want to use an illusion. He didn't want the children to think of a computer as magic.

So he hit upon the idea of a simple flip-flop switch (the most common circuit in a computer) represented by the head or tail of a penny. This flip-flop circuit uses just one penny. Every time it receives an impulse it changes from head to tail or tail to head. Simple.

But then Joe went on and put two of these simple flip flops together to make a circuit that adds two numbers together. And another that subtracts numbers. Kids loved these circuits and played with them like games.

Games With Pennies

Before long, Joe devised circuits to play more complicated games like Tic Tac Toe.



"Heads Up Game." Starting with tails in all positions, how many times through to get all four pennies heads up?

Guess A Number and Create A Pattern. Pretty soon he had 30 circuits (or games) that explained everything about computers from a basic adder to complex error correction. The most complex circuit uses just nine pennies (or dimes for the big spender).

These circuits, each one with a full size playing diagram, have been collected together in a book called *Computer Coin Games*. With this book children or adults can easily understand the workings of even the most complex computer circuits.

Games Magazine said, "whether or not you have any experience with computer technology, you'll be both amazed and delighted with the simplicity of the format and the complexity of the play. All you need is some common cents."

Dr. Dobbs Journal agreed, saying, "*Computer Coin Games* is a simple approach to a complicated concept. The book is liberally sprinkled with clever illustrations and diagrams, and provides a relatively painless route to understanding how computer circuits function."

Money back Guarantee

We're convinced that you'll understand the inner workings of a computer after playing these 30 games. If you don't, send the book back and we'll refund the complete price plus your postage to send it back.

To order your copy of *Computer Coin Games*, just send $3.95 plus $2.00 for one, $3.00 for two or more for shipping and handling to Creative Computing Press, Morris Plains, NJ 07950. Visa, MasterCard and American Expess orders may be called toll free to 800-631-8112 (in NJ, 201-540-0445).

With its wonderful illustrations by Sunstone Graphics, *Computer Coin Games* makes an ideal gift. *The Association for Educational Data Systems* calls the book "an ideal introduction to the concepts of computer circuitry."

Order your copy today.

creative computing

Morris Plains, NJ 07950
Toll-free **800-631-8112**
(In NJ 201-540-0445)

CIRCLE 350 ON READER SERVICE CARD

Computer Lawnmower

Can a computer mow your lawn? Not yet.

But a flowchart can show you how to make money cutting five lawns a day. The flowchart is easy. Mowing the lawns is still hard work.

Dr. Sylvia Charp and Marion Ball wanted a way to introduce basic computer concepts to children in grades 5 to 9 of the Philadelphia City Schools. So they identified some tasks that kids understood like mowing lawns, issuing paychecks and controlling traffic lights. They showed how computers are used in these tasks.

Flowcharts - A basic concept

They devised flowcharts. They located scores of photos. And they found an artistic high school student to illustrate these concepts with lively full-color drawings.

They then wrote a light-hearted but informative text to tie it all together. It talked about kinds of computers, what goes on inside the machine, the language of the computer and how computers work for us.

They took the problem of averaging class grades and showed how a simple yrogram could be written to do this job.

Well-qualified authors

Marion Ball has written other books on computer literacy. Sylvia Charp is the director of educational compuuting for Philadelphia City Schools. They pooled their talents to produce this book, Be A Computer Literate.

This easy-to-read book explains how computers are used in medicine, law enforcement, art, business, transportation and education. It's interesting and understandable.

Too much demand

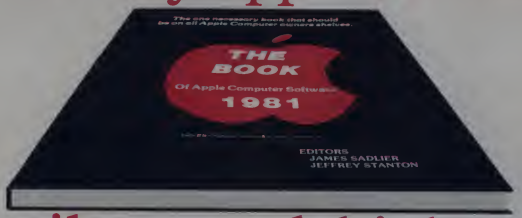
The Bell System distributed 50,000 copies to schools throughout the U.S. but they couldn't meet the continuing demand. So Creative Computing Press now distributes the book. It's just $3.95 plus $1.00 shipping and handling. Send name and address plus payment or credit card number and expiration date to Creative Computing Press, Morris Plains, NJ 07950. Visa, MasterCard and American Express orders may also be called in toll-free to 800-631-8112 (in NJ 201-540-0445).

Order yours today. If, after reading it, you do not feel that you are "computer literate," return it for a full refund plus your postage to send it back.

creative computing

Morris Plains, NJ 07950
Toll-free **800-631-8112**
(In NJ 201-540-0445)

Don't buy Apple Software



until you read this book.

First check The Book—the one complete critical analysis of most Apple Software available. Games, Educational, Business, Utility programs and more. Each comprehensively rated on 11 separate points. Each reviewed by an expert in its field. Just $19.95.

Now you can compare and get more for your software dollar. Does the program you need exist? How good is it? Which software vendors offer the best support? Find out all this and much more.

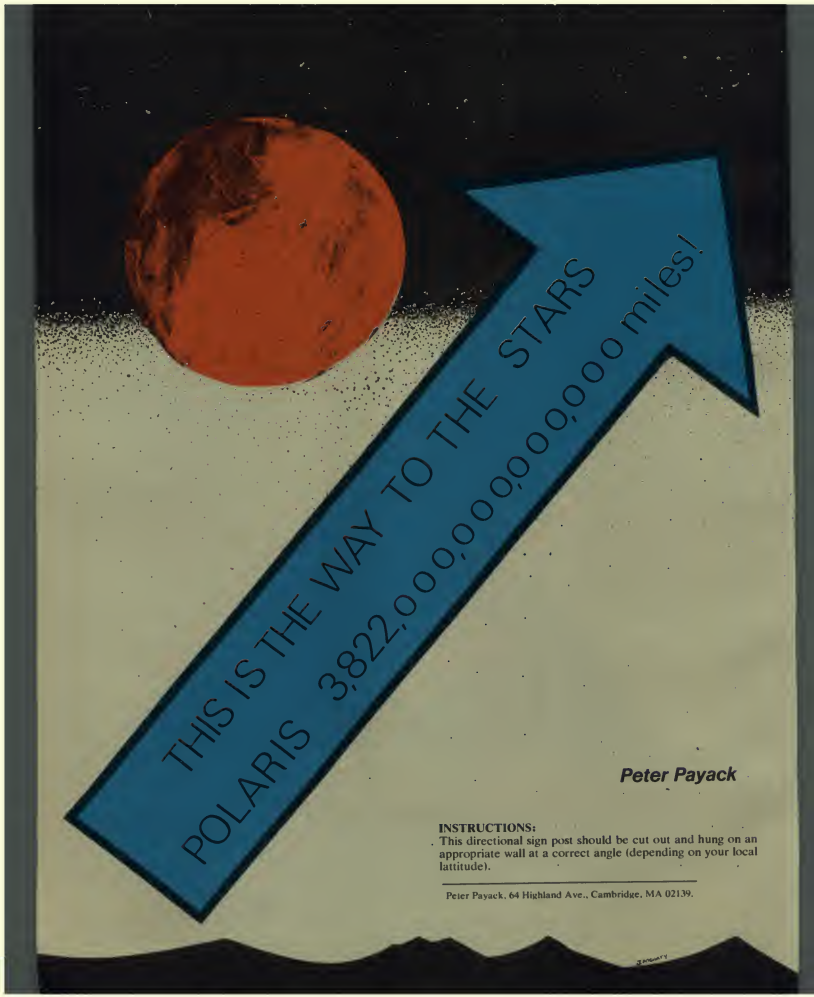
MasterCard & Visa accepted. Fill out and mail today or call for shipment.

Calif residents add 6%

NAME _____
ADDRESS _____
CITY _____ STATE _____ ZIP _____
CARD NUMBER _____ EXP. _____

The Book Company

16720 HAWTHORNE BLVD., LAWNDALE, CA 90260. (213) 371-4012.



Peter Payack

INSTRUCTIONS:
This directional sign post should be cut out and hung on an appropriate wall at a correct angle (depending on your local lattitude).

Peter Payack, 64 Highland Ave., Cambridge, MA 02139.

READ THESE:

MICROCOMPUTER INTERFACING

Bruce Artwick
Nine chapters include: selecting the right microprocessor, microcomputing input and output, interface components and their characteristics, plus much more.
cloth $21.95

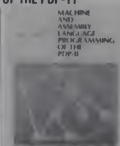
COMPUTER GAMES

J. Victor Nahigian & William Hodges
Dozens of games for microcomputers and PDP-11 and PDP-12 computers. All games written in BASIC. Includes Boggle, Blackjack, Tennis, and 26 other games.
paper $10.95

COMPUTER PROGRAMS IN BASIC

Paul Friedman
Guide to over 16,000 BASIC computer programs recently published in personal computer magazines for micro, mini, and "large frame" computers.
paper $10.95

MACHINE AND ASSEMBLY LANGUAGE PROGRAMMING OF THE PDP-11



Arthur Gill
Explains the basic organizational and operational features of the PDP-11, including machine and assembly language techniques.
cloth $19.95

Z80 USERS MANUAL

Joseph Carr
All-in-one guide to Z80 pin definitions, CPU control signals, support chips, interfacing peripherals, and more.
paper $10.95

MICROPROCESSOR PROGRAMMING AND SOFTWARE DEVELOPMENT

F.G. Duncan
Provides microprocessor users with an introduction to programming and to the basic design of software
cloth $29.95

SEE THESE AND OTHER PRENTICE-HALL COMPUTER BOOKS AT:

CALIFORNIA
Univ. Bookstore
Univ of California
Irvine CA 92717
(714)833-7412
Op Amp/Tech Books
1033 N. Sycamore Ave
Los Angeles CA 90038
(213)464-4322
Technical Book Co.
2056 Westwood Blvd
Los Angeles CA 90025
(213)475-5711
Kepler's Books
&Magazines
825 El Camino Real
Menlo Park CA 94025
(415)324-4321
Cody's Books Inc.
2454 Telegraph Ave
Berkley CA 94704
(415)845-7852
Printers Inc. Bookstore
310 California Ave
Palo Alto, CA 94306
(415)327-6500
Technical Book Dept
UCLA Bookstore
308 Westwood Plaza
Los Angeles CA 90024
(213)825-7711 ex239

CONNECTICUT
U. of Connecticut
U of Conn Coop
Fairfield Ave
Storrs CT 06268
(203)486-2000
COLORADO
Computers by Cosco
12351 W. 60th Ave
Arvada CO 80004
(303)421-6361
Aurania Book Stores
955 Lawrence
Denver CO 80204
(303)629-3230

FLORIDA
The Bookery, Inc
2107 S. Babcock
Melbourne FL 32901
(305)727-8608
Paperback Booksmith
Sarasota Square Mall
8201 S. Tamiami Trail
Sarasota FL 33581
(813)922-5000

ILLINOIS
Data Domian
of Schamburg
1612 E. Algonquin Rd
Schamburg IL 60195
(312)397-8700
Kroch's & Brentano's
29 S. Wabash St
Chicago IL 60603
(312)332-7500
Chicago Circle
Center Bookstore
Univ Ill. at Chicago Cir
777 S. Halsted St
Chicago IL 60607
(312)996-2651
INDIANA
University Bookstore
360 State St
West Lafayette IN 47906
(317)743-9619
MICHIGAN
Michigan State Univ.
M.S.U. Bookstore
East Lansing MI 48824
(517)355-3434
MISSOURI
Univ. Missouri
Bookstore
1012 E. 52nd
Kansas City MO 64110
(816)276-1401
NEW JERSEY
Newark Book Center
162 Washington St
Newark NJ 07102
(201)642-7956

McGraw Hill Bookstore
Princeton & Hightstown Rd
Hightstown, NJ 08520
(609)448-1700
NEW MEXICO
Holman's Inc.
401 Wyoming Blvd NE
Albuquerque NM 87123
(505)265-7981
NEW YORK
McGraw Hill Bookstore
1211 Ave of the Americas
New York NY 10020
(212)997-4115
OHIO
Barnes & Noble Bookstore
2400 Euclid Ave
Cleveland OH 44115
(216)861-6464
TEXAS
Congress Ave Booksellers
705 Congress Ave
Austin TX 78701
(512)478-1157
The Micro Store
634 S. Central Expressway
Richardson TX 75080
(214)231-1096

Bookmaster
911 Nasa One
Houston TX 77058
(713)488-6170
The Book Merchant
1810 Main
Dallas TX 75201
(214)748-5196
Ted Brown's Post Oak
Bookstore
5020 Westheimer
Houston TX 77056
(713)623-8263
Brown Book Shop
1219 Fannin
Houston TX 77002
(713)632-3937
WASHINGTON
The Elliott Bay
Book Company
103 S. Main St
Seattle WA 98104
(206)Main 4-6600

WISCONSIN
North Shore Computers
115 W. Silverspring
Milwaukee WI 53217
(414)963-9700
Harry W Schwartz Book Shop
440 W. Wisconsin Ave
Milwaukee WI 53203
(414)272-2700

TO ORDER BY MAIL
Send to the bookstore nearest you

PLEASE SEND ME
copies of Computer Games For Businesses Schools, and Homes @ **$10.95** paper
copies of Computer Programs in Basic @ **$10.95** paper
copies of Machine and Assembly Language Programming of the PDP-11 @ **$19.95** cloth
copies of Microcomputer Interfacing @ **$21.95** cloth
copies of Microprocessor Programming and Software Development @ **$29.95** cloth
copies of Z80 Users Manual @ **$10.95** paper

Total Price for Books $ ____
Add state and sales tax (if applicable) and $1.25 per book

Total enclosed ____
check ____ money order ____
master charge ____ visa ____
Acct # ____

NAME ____

ADDRESS ____

CITY ____

STATE ____ ZIP ____

All prices subject to change

Bear with me a little while...

Mel Banks, Jr.

"But *why* can't I keep you, Bert?" James asked. His voice was small and tremulous, with a trace of childish whine. He sat on the edge of a metal-framed bunk, one of many identical ones arranged in orderly rows in a long, dimly lit room. The other occupants of the room slumbered peacefully, oblivious to the voices coming from James' bunk. "Don't you love me anymore, Bert?" James asked the toy bear he held on his knees.

"Of course I do, James," the bear replied in tones calculated to soothe. The voice was warm and mellow, belying the toy's diminutive size. It came from within the bear's plump, soft plastic torso. The mouth, a molded line of simulated stitchery from which a tiny pink tongue protruded, did not move. The eyes, two dark spots in the shape of buttons, stared sightlessly.

"No you don't either, Bert," James said, shaking his head emphatically back and forth, "or you wouldn't talk about leaving me. You don't leave somebody if you love them."

"I do love you, James," the bear said gently, persuasively, "but in my own way. Remember, I am not a human personality. I am a Behavioral Engineering Remote Terminal. I have assisted in your rapid development to this stage, but now you must be weaned from soft-toy devices. You no longer need a BERT, James."

"I do too, Bert," James cried, giving the bear a sharp little bounce on his knees for emphasis. "You know more than anybody in the world. Who'll tell me stories and talk to me at night?" Tell me a story now, Bert, please."

"A little later," the bear said firmly. "First we must talk about this. You see, in my present form I am only suitable for early childhood. From now on you will learn from the datanet and from your instructors. And since the datanet includes among its resources my own program modules and history files, you will still be able to talk to me there."

"No!" James said shrilly, thumping the bear down hard against his knees. "I hate the datanet. I can't even see it or touch it, and it doesn't sound like you do. Why can't I keep you, Bert, *why*?"

The bear was silent for a moment. "It is not possible for you to fully understand at this point," it said. "Your career is to be in theoretical research, for which creativity and independent thought are as important as high intelligence. You must not, therefore, become psychologically dependent on me, or on the datanet, or on the people around you."

Melvin D. Banks, Jr., 12706 Meadowood Dr., Silver Spring, MD 20904.

"No!" James yelped desperately. "I love you, and I love people, too. I'm going to keep you for always. You can't go." He crushed the bear to his chest and hugged it, rocking back and forth on the edge of the bunk. "Now tell me about the four little rabbits, Bert, where one was naughty."

"*The Tale of Peter Rabbit*, by Beatrix Potter," the bear stated flatly. Its voice was muffled against James' chest. "Very well, we will analyze that story together. But first I must be sure that you understand that in the morning, when you awaken from sleep period, I will not be here. An instructor will be here instead, and..."

"You know more than anybody in the world. Who'll tell me stories and talk to me at night?"

"Shut up, Bert!" James screamed suddenly. "Shut up! Be quiet!" He thrust the bear in front of him at arm's length and shook it violently. "You be quiet!" he screamed again, his voice disintegrating into spasmodic mouthings.

"That is not rational behavior, James," the bear said, its voice now serious and authoritarian. "Let me talk to the datanet. Connect me."

"NO! NO! NO!" James shouted. His eyes rolled upward in their sockets. He flung the plastic bear at the wall, where it crashed into a shelf full of toys and games, scattering them on the floor. With a low moan, he threw himself face down on the floor and began flailing the tile with his arms and legs, his head jerking wildly.

"Connect me to the datanet immediately, James," the bear said from amidst the clutter of fallen playthings. Its voice strained for volume over the commotion James was making on the floor. "It is urgent that I talk to the datanet, James."

A door opened at the far end of the long room, admitting a cool, sanitary light which fell across the rows of bunks. A woman wearing a white lab coat strode briskly down the aisle to where James lay thrashing on the floor. She glanced down

at him. His head was pounding the floor repeatedly, resounding against it with sharp smacks. He emitted a series of barking grunts and guttural clucking noises. She knelt down, deftly caught the back of his neck between her thumb and fingers, and squeezed. Abruptly he lay still.

The woman studied James carefully for a moment, then stood up frowning. She walked over to where the bear lay and picked it up. "What are you programmed for?" she asked it.

"My current programming is for Undifferentiated Theoretician, Accelerated Learning," it responded.

"It is urgent that I talk to the datanet, James."

"Theoretician," the woman repeated thoughtfully. She looked down at the inert form of James lying sprawled on the floor. Pale green fluid had begun to ooze from his ears and nose. Metal glinted dully through a tear in the smooth skin-covering of a cheekbone. His forehead, flattened, bore the crosshatched imprint of the ceramic floor tiles. "That unit is only Personal Servant class," she said. "A valet, I think. It couldn't possibly respond to that kind of conditioning, much less accelerated learning. Amazing it lasted this long."

She picked up a clipboard that hung from the foot of the bunk, setting the bear down as she did so. "There's been some kind of mixup here," she said. She glanced from the clipboard to James and back, made a notation, and left the room.

"Connect me to the datanet," the bear said to no one. □

EDUCATIONAL SOFTWARE

for the APPLE* II and TRS-80*

VERBAL SKILLS

Diskettes with Basic programs and data base can be used to improve verbal skills interactively. Intended as study aids for college board type exams (e.g., SAT, GRE, LSAT, ACT, MAT, etc.). Programs include a resident editor for expanding or modifying data lists. Realistic multiple choice questions are generated with several options. Requires no computer experience, making it ideal for students.

Vocabulary Builder-	Over 1600 entries with option of matching synonyms or antonyms - $24.95
Word Analogy-	Over 1200 word relationships - $24.95
Sentence Completion-	Equivalent to 6 SAT tests - $24.95
Verbal Skills Pak-	All three diskettes for just $59.95

SLIWA ENTERPRISES
SOFTWARE DEPARTMENT
POST OFFICE BOX 400
BIG FLATS, NEW YORK 14814
607/562-3287

* Apple is a registered trademark of Apple Computer, Inc.
* TRS-80 is a registered trademark of Tandy Corp

CIRCLE 259 ON READER SERVICE CARD

Every PET™ Needs a Friend.

CURSOR is the best friend your Commodore PET will ever have. Since July, 1978 we have published 150 of the most user-friendly programs for the PET available anywhere. When we write or edit a program, we spend lots of time fussing about how it will treat you. We pay attention to lots of little things that help make using a computer a pleasure instead of a pain.

Naturally, **CURSOR** programs are technically excellent. Each program that we purchase is extensively edited or re-written by a professional programmer. But *imagination* is just as important as being user-friendly and technically good! We delight in bringing you off-beat, unusual programs that "show off" the abilities of your PET or CBM.

CURSOR is user-friendly, technically great and full of imaginative programs. And every issue of **CURSOR** is still available! We continue to upgrade previously published programs so that they'll work on the three varieties of Commodore ROM's (Old, New, and 4.0). New issues also work on the 80 column CBM.

For only $4.95 you can buy a sample issue and judge for yourself. Or send $27 for a six-issue subscription. Each **CURSOR** comes to you as a C-30 cassette with five programs and a graphic Front Cover, ready to LOAD and RUN on your PET.

Who knows? After your PET meets **CURSOR**, things may never be the same!

Published By:

THE CODE WORKS
Box 550
Goleta, CA 93116
805-683-1585

Distributed by
AUDIOGENIC Ltd.
P. O. Box 88
Reading, Berkshire

SYSTEMS FORMULATE Corp.
Shin-Makicho Bldg. 1-8-17
Yaesu, Chuo-Ku, Tokyo 103

CIRCLE 179 ON READER SERVICE CARD

Determining Economic Order Quantity

Wm. M. Lowerre, Jr.

Microcomputer magazines are full of ads for business inventory systems. Most of these systems are essentially accounting systems. That is, they account for inventory transactions and maintain on-hand and on-order balances. Inventory systems are logical candidates for computerization because of the relatively large volume of data that must be manipulated frequently.

Some inventory systems include such data as order quantity, maximum quantity, minimum quantity, reorder point, unit price and annual demand forecast. These data are not transaction data but are necessary to the reorder decision process. That is, they help decide how much to order and when to order. Unfortunately, many inventory software packages available for micros today do not help the manager determine what these variables should be.

Fortunately, there are well and widely known models for calculating 1) the forecast of demand, 2) the most economical quantity to order, and 3) the inventory level at which the reorder should be placed. And unit cost can be obtained either from vendors or from the business cost accounting records. Computers, of course, are very adept at manipulating such models and are a necessity where the model must be exercised repeatedly, as for an inventory of a large number of different items reordered frequently.

Wm. M. Lowerre, Jr., 7458 Colton Lane, Manassas, VA 22110.

This article describes a program that calculates the order quantity that minimizes the costs affected by the order or lot size decision. Demand forecasts and reorder point calculation will be left for subsequent articles. The EOQ program described here was written on tape for a TRS-80 with Level II Basic and 16K of core without a printer. Most small businessmen should find it interesting, useful and profitable, though they will likely want to convert it for use with a printer.

There are two kinds of costs incurred as a result of ordering inventory: 1) The costs associated with placing and receiving each order, and 2) the costs associated with carrying inventory in stock after it is received.

EOQ Costs

There are two kinds of costs incurred as a result of ordering inventory: 1) The costs associated with placing and receiving each order, and 2) the costs associated with carrying inventory in stock after it is received. It is not easy, or sometimes even feasible, to extract these costs from most accounting systems. However, they can be estimated reasonably accurately.

Costs associated with placing and receiving an order include: postage, forms and stationery; buyer time, telephone cost, shipping costs; receiving and receiving inspection; posting and payment of accounts payable. These costs must be estimated on a cost-per-item-order basis. The cost-per-item-order of procurement telephones might be estimated, for example as:

$$\frac{\text{total annual procurement telephone expense}}{\text{Total number of P.O.'s issued X average number of items/order}}$$

Costs associated with carrying inventory include: interest, insurance, space, heat, light, shelving, obsolescence, theft and breakage. These carry costs must be estimated on a rate per year basis, i.e. as a dollar cost per year per dollar of inventory carried. The carry cost rate for warehouse space, heat and light, for example is calculated as:

$$\frac{\text{annual cost of warehouse space, heat, light}}{\text{average dollar inventory}}$$

THE PROGRAM STORE

CALL TOLL FREE 800 424-2738

new

DUEL «N» DROIDS

By Leo Christopherson from Acorn

Your 'droid has already learned NIM, so now it's time to teach it how to wield a laser sword! Leo Christopherson, author of "Android NIM," "Dancing Demon" and other animations, has developed a new type of animation and high-quality sound in his latest work.

Your 'droid starts out as a lowly clown. You teach it how to use a laser sword by controlling its movements. After training it to be a "Grand Master," you enter the tournament against the program's skilled 'droid! Entertainment for all ages.

Protected Tape... $14.95
Protected Disk... $20.95

DEATH-MAZE 5000

from Med Systems

A new breed of adventuring! Venture through a graphically represented 3-D maze, with halls that could lead end or recede to infinity. Step through the doors or drop into the pits. Will you encounter monsters and mayhem, or will you be treated to useful objects and information? Will you avar get out alive?

You may never find your way out of Deathmaze 5000, but you'll keep trying!

16K TRS-80, 32K APPLE II... $12.95

Unbelievable Realtime 3-D Graphics!

FLIGHT SIMULATION

From Sub Logic

The wait is over! If 3 D graphics seem impossible on the low resolution TRS-80, you haven't seen this brilliant program. During FLIGHT SIMULATION, you instantly select instrument flight, radar, or a breathtaking pilot's eye view. But be sure to strap yourself in — you're liable to get dizzy!

Once you put in some air time learning to fly your TRS 80, head for enemy territory and try to bomb the fuel depot and airstrip while fighting off five enemy warplanes. Good Luck!

Level I or II Tape... $25.00

TRS-80 Level II 16K unless otherwise noted

SUPER NOVA

By Bill Hacua from Big Five

Asteroids surround your ship. You must shoot the asteroids, as well as any alien spaceships. Written in fast machina code, this game is GREAT!

You may encountar five diffarent kinds of alien ships, including the vary deadly flagship. You shoot from your ship's position, rotate it, use your thrusters to move — if you are overwhalmad, you can even get away to hyperspaca. Fast and axciting.

Tape... $14.95

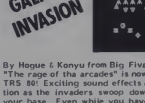
SPACE WAR

By Device Orlantad Games from Acorn

A two-player, raal-tima action game that lets each playar control a spaceship with rotate, thrust, fire, and hyperspaca. Fiva game options (including gravity) and three playing speeds. In fast machine languaga.

Tape... $9.95

GALAXY INVASION



By Hogue & Konyu from Big Five

"The rage of tha arcades" is now available for TRS 80! Exciting sound effects add to the action as the invaders swoop down to destroy your base. Even while you have your hands full battling tha aliens, you have to watch out for the Flagship! Super graphics, super action, super fun!

Level I or II, tape... $14.95

PINBALL

By John Allen from Acorn

Get your flipper fingers ready for action in this real-time, machine language gema.

Lots of sound and flashing graphics maka this fast action gama so much like the raal thing that you'll have to remind yourself not to shake your TRS-80. Choose from five playing speeds to match your skill. Can you beat your friends' scoras? Will you avoid the draaded "Bermuda Square!" Get PINBALL today and find out.

Protected tape... $14.95
Protectad disk... $20.95

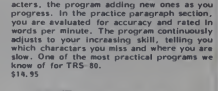
TYPING TUTOR

By Ainsworth & Baker from Microsoft

Speed up your programming and word processing with this excellent touch typing instructional program. Divided into two sections, the program first teaches proper finger positioning. You practice keying various characters, the program adding new ones as you progress. In the practice paragraph section, you are evaluated for accuracy and rated in words per minute. The program continuously adjusts to your increasing skill, telling you which characters you miss and where you are slow. One of the most practical programs we know of for TRS-80.

$14.95

DDT Disk Drive Timer



from Disco Tech

Analyze and adjust your disk driva motor speed with a real-time graphic display. Manual datails use for Radio Shack, Shugart, MPI, Pertec and Vista drivas, and DDT can be used with any driva. All you need is DDT, two screwdrivers and five minutes.

Disk..... $29.95

INVADERS FROM SPACE

by Carl Miller from Acorn

A fast machine language approach to this classic (and addictiva) space game. As you play, the aliens drop bombs, mova from side to side, and try to overrun your bases. Hold them off and score — by shooting them down. But, just as you think you've got it all under control, the action speeds up.

Choose the game speed, enemy bomb frequency and accuracy, shots on screen and the number of your bases. Move your base and simultaneously fire at the invaders — you cannot do this in most similar games. Full sound effects add evan more excitement to the incredible speed and action of INVADERS FROM SPACE. Fun for all ages and skill levels.

Protected tape... $14.95
Protected disk... $20.95

Visit Our New Store: W. Bell Plaza – 6600 Security Blvd · Baltimore, MD

TO ORDER CALL TOLL FREE 800 424-2738 For information Call (202) 363-9797

MAIL ORDERS: Send check or M.O. for total purchase price, plus $1.00 postage & handling. D.C. residents, add 6% tax. Charge card customers: include all embossed information on card.

THE PROGRAM STORE
4200 Wisconsin Avenue NW, Dept. R 11 Box 9609
Washington, D.C. 20016

CIRCLE 175 ON READER SERVICE CARD

Quantity, continued...

Figure 1 illustrates the case where an order arrives in inventory just as the inventory is depleted, and where the inventory is withdrawn regularly in small increments. The average inventory on hand is equal to 1/2 the order quantity, Q. If the dollar cost per unit is CU and the carrying cost rate is CC, then the annual carrying cost, AC, is QxCUxCC/2. AC increases linearly with Q, as seen in Figure 2.

If annual requirements (demand) are forecast as RA, and the cost to place an order for one item is CO, then the annual cost to order the item AO, is COxRA/Q, since RA/Q equals the number of orders placed per year. Annual ordering cost total for this item, AO, decreases curvilinearly, inversely with Q.

The total annual cost, TAC, is the sum of the annual order and annual carry costs, or TAC = AO+AC. TAC first decreases with Q, reaches a minimum—at the economic order quantity (EOQ)—and then increases with Q.

The EOQ can be calculated utilizing calculus. Or it can be demonstrated through iterative examples. The program presented here provides examples. The next paragraph summarizes the mathematics.

To find the order quantity Q, that gives the least total annual cost, TAC, take the derivative, with respect to Q, set it equal to zero, and solve. The result is:

$$(EO)Q = \frac{2xRAxCO}{CUxCC}$$

This equation gives the order quantity that results in the minimum total annual cost of ordering and carrying an inventory item. It is known as the Economic Order Quantity or EOQ.

Program Description

The program shown here utilizes the equation above to calculate the EOQ for two sample items (part numbers). Data for part number, annual requirement, order cost and unit cost are stored internally in Data statements (at 1120-1140). Following the title (10-60), a table of variables (70-180) and introductory comments (200-210), the program displays the stored data (230-280), and then requests the operator to input the carrying cost rate (300). The display is shown in Figure 3.

The carrying cost rate (CCR) is not stored since it may vary for different sets of items or part numbers at a given firm, and almost certainly will vary from firm to firm. In addition, management may prefer to treat CCR as a policy variable to shift costs rationally between ordering and carrying as conditions, e.g., in the money or labor markets, dictate from time to time.

The program then calculates the yearly requirements in dollars, the EOQ and the equivalent month's supply to order for each item/part number, and displays them in a table (310-380). This table is shown in Figure 4.

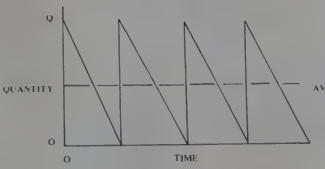


Figure 1. Item Inventory Over Time.

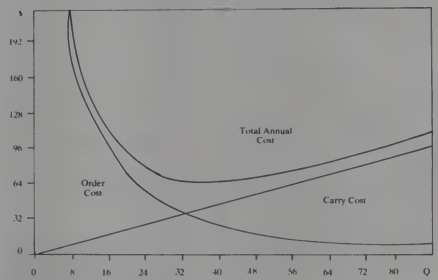


Figure 2. Cost vs. Order Quantity.

Part Number	Units Rqd. Yrly.	Unit Costs	Order Costs
428301	200	5.75	5.58
428302	462	12.76	10.05
428303	311	10	30

Figure 3.

Part Number	Yrly. $ Rqd.	Econ. Ord. Qty.	Month's Supply
428301	1150	31	1.86
428302	15135.1	26	.67
428303	3110	68	2.67

Figure 4.

QUALITY DISK SOFTWARE

BACKED BY ON-GOING APPLICATIONS SUPPORT

APPLE II Ⓐ *TRS•80* Ⓣ

HOME FINANCE PAK I: Entire Series $49.95 Ⓐ Ⓣ
CHECK REGISTER AND BUDGET: This comprehensive **CHECKING ACCOUNT MANAGEMENT SYSTEM** not only keeps complete records, it also gives you the analysis and control tools you need to actively manage your account. The system provides routines for **BUDGETING INCOME AND EXPENSE**, **AUTOMATIC CHECK SEARCH**, and **BANK STATEMENT RECONCILING**. **CRT** or printer reports are produced for **ACTUAL EXPENSE vs BUDGET**, **CHECK SEARCH DISPLAY**, **RECONCILIATION REPORT** and **CHECK REGISTER DISPLAY** by month. Check entry is prompted by user-defined menus of standard purposes and recipient codes, speeding data entry and reducing disk storage and retrieval time. Six fields of data are stored for each check: amount, check no., date, purpose, recipient and **TAX DEDUCTIBLE REMINDER**. **CHECK SEARCH** routines allow searching on any of these data fields. Up to 100 checks/mo. storage $39.95

SAVINGS: Account management system for up to 20 separate Savings accounts. Organizes, files and displays deposits, withdrawals and interest earned for each account $14.95

CREDIT CARD: Get Control of your credit cards with this program. Organizes, stores and displays purchases, payments and service charges for up to 20 separate cards or bank loans. $14.95

UNIVERSAL COMPUTING MACHINE: $49.95 Ⓐ
A user programmable computing system structured around a 50 row x 50 column table. User defined row and column names and equations forming a unique computing machine. Table elements can be multiplied, divided, subtracted or added to any other element. Hundreds of unique computing machines can be defined, used, stored, and recalled, for later use. Excellent for sales forecasts, budgets, inventory lists, income statements, production planning, project cost estimates-in short for any planning, analysis or reporting problem that can by solved with a table

COLOR CALENDAR: $29.95 Ⓐ
Got a busy calendar? Organize it with Color Calendar. Whether it's birthdays, appointments, business meetings or a regular office schedule, this program is the perfect way to schedule your activities
The calendar display is a beautiful **HI-RES** color graphics calendar of the selected month with each scheduled day highlighted in color. Using the daily schedule, you can review any day of the month and schedule an event or activity in any one of 20 time slots from 8:00 A.M. to 5:30 P.M.

BUSINESS SOFTWARE: Entire Series $159.95 Ⓐ Ⓣ
MICROACCOUNTANT: The ideal accounting system for small businesses. Based on classic T-accounts and double-entry booking, this efficient program provides a journal for recording posting and reviewing up to 1,000 transactions per month to any one of 300 accounts. The program produces **CRT** and printer reports covering:

TRANSACTION JOURNAL	**BALANCE SHEET**
ACCOUNT LEDGERS	**INCOME AND EXPENSE STATEMENT**

Includes a short primer on Financial Accounting. (48K) $49.95

UNIVERSAL BUSINESS MACHINE: This program is designed to **SIMPLIFY** and **SAVE TIME** for the serious businessman who must periodically Analyze, Plan and Estimate. The program was created using our Universal Computing Machine and it is programmed to provide the following planning and forecasting tools:

CASH FLOW ANALYSIS	**SALES FORECASTER**
PROFORMA PROFIT & LOSS	**SOURCE AND USE OF FUNDS**
PROFORMA BALANCE SHEET	**JOB COST ESTIMATOR**
REAL ESTATE INVESTMENT	**INVENTORY ANALYSIS**

Price, including a copy of the Universal Computing Machine $89.95

BUSINESS CHECK REGISTER AND BUDGET: Our Check Register and Budget programs expanded to include up to 50 budgetable items and up to 400 checks per month. Includes bank statement reconciling and automatic check search (48K) $49.95

ELECTRONICS SERIES VOL I & II: Entire Series $259.95
LOGIC SIMULATOR: SAVE TIME AND MONEY. Simulate your digital logic circuits before you build them. **CMOS, TTL**, or whatever, if it's digital logic, this program can handle it. The program is an interactive, menu driven, full-fledged logic simulator capable of simulating the bit-time response of a logic network to user-specified input patterns. It will handle up to 1000 gates, including **NANDS, NORS, INVERTERS, FLIP-FLOPS, SHIFT REGISTERS, COUNTERS** and user-defined **MACROS**, up to 40 user-defined random, or binary input patterns. Accepts network descriptions from keyboard or from **LOGIC DESIGNER** for simulation ..... $159.95 Ⓐ Ⓣ

LOGIC DESIGNER: Interactive **HI-RES** graphics program for designing digital logic systems. Draw directly on the screen up to 10 different gate types, including **NAND, NOR, INVERTER, EX-OR, T-FLOP, JK-FLOP, D-FLOP, RS-FLOP, 4 BIT COUNTER** and **N-BIT SHIFT REGISTER**. User interconnects gates using line graphics commands. Network descriptions for **LOGIC SIMULATOR** generated simultaneously with the **CRT** diagram being drawn ..... $159.95 Ⓐ

MANUAL AND DEMO DISK: Instruction Manual and demo disk illustrating capabilities of both program (s) ..... $29.95 Ⓐ Ⓣ

ELECTRONIC SERIES VOL III & IV: Entire Series $259.95
CIRCUIT SIMULATOR: Tired of trial & error circuit design? Simulate & debug your designs before you build them! With **CIRCUIT SIMULATOR**, you build a model of your circuit using **RESISTORS, CAPACITORS, INDUCTORS, TRANSISTORS, DIODES, VOLTAGE** and **CURRENT SOURCES** and simulate the waveform response to inputs such as **PULSES, SINUSOIDS, SAWTOOTHS**, etc all fully programmable. The output is displayed as an **OSCILLOSCOPE-STYLE PLOT** of the selected waveforms (Apple only) or as a printed table of voltage vs time. Handles up to 200 notes and up to 20 sources. Requires 48 **RAM** ..... $159.95 Ⓐ Ⓣ

CIRCUIT DESIGNER: Interactive **HI-RES** graphics program for designing electronic circuits. Draw directly on the screen up to 10 different component types, including those reterenced above. Components interconnect list for **CIRCUIT SIMULATOR** generated automatically. Requires $159.95

MATHEMATICS SERIES: Entire Series $49.95
STATISTICAL ANALYSIS I: This menu driven program performs **LINEAR REGRESSION** analysis, determines the mean, standard deviation and plots the frequency distribution of user-supplied data sets. Printer, Disk. I/O routines $19.95

NUMERICAL ANALYSIS: **HI-RES** 2-Dimensional plot of any function. Automatic scaling. At your option, the program will plot the function, plot the **INTEGRAL**, plot the **DERIVATIVE**, determine the **ROOTS, MAXIMA, MINIMA, INTEGRAL VALUE** $19.95

MATRIX: A general purpose, menu driven program for determining the **INVERSE** and **DETERMINANT** of any matrix, as well as the **SOLUTION** to any set of **SIMULTANEOUS LINEAR EQUATIONS** $19.95

3-D SURFACE PLOTTER: Explore the **ELEGANCE** and **BEAUTY** of **MATHEMATICS** by creating **HI-RES PLOTS** of 3-dimensional surfaces from any 3-variable equation. Disk save and recall routines for plots. Menu driven to vary surface parameters. Hidden line or transparent plotting $19.95

ACTION ADVENTURE GAMES: Entire Series $29.95 Ⓐ
REO BARON: Can you outfly the **REO BARON?** This fast action game simulates a machine-gun **DOGFIGHT** between your **WORLD WAR I BI-PLANE** and the baron's. You can **LOOP, DIVE, BANK** or **CLIMB** and so can the **BARON**. In **HI-RES** graphics plus sound $14.95

BATTLE OF MIDWAY: You are in command of the **U.S.S. HORNETS' DIVE-BOMBER** squadron. Your targets are the Aircraft carriers, Akagi, Soryu and Kaga. You must fly your way through **ZEROS** and **AA FIRE** to make your **DIVE-BOMB** run. In **HI-RES** graphics plus sound. $14.95

SUB ATTACK: It's April 1943. The enemy convoy is headed for the **CONTROL SEA**. Your sub, the **MORAY**, has just sighted the **CARRIERS** and **BATTLESHIPS**. Easy pickings. But watch out for the **DESTROYERS** - they're fast and deadly. In **HI-RES** graphics plus sound $14.95

FREE CATALOG-All programs are supplied on disk and run on Apple II w/Disk][Applesoft **ROM** Card & **TRS-80** Level II and require 32K **RAM** unless otherwise noted. Detailed instructions included. Orders shipped within 5 days. Card users include card number. Add $1.50 postage and handling with each order. California residents add 6½% sales tax. Foreign orders add $5.00 postage and handling.

SPECTRUM SOFTWARE
142 Carlow, P.O. Box 2084
Sunnyvale, CA 94087

FOR PHONE ORDERS: (408) 738-4387 VISA
DEALER INQUIRIES INVITED.

CIRCLE 189 ON READER SERVICE CARD

The operator is then queried as to his preference for seeing a tabular display demonstrating the effect on TAC, AC, and AO of varying Q on either side of EOQ, (390-420). If he so prefers, then, for a specified part number the display in Figure 5 is shown on the monitor (450-610). Order costs are slightly different from carry costs since decimal quantities are not permitted for the quantity.

The operator is next queried as to his preference for seeing a graphic display of the data (620). If he so desires, the graphic display in Figure 2 will be constructed for the same part number as shown previously in the tabular format (630-1010).

The range of quantity values for the X scale is first defined as twice the EOQ, and the range of total cost is established as twice the total cost at the EOQ, (630-640). This forces the graphics to be centered on the screen regardless of the values of Q and TC. The X axis is drawn (660) and markers are positioned (670). The scale value of the X marker interval is next established by repeatedly dividing the range values by 2 (680-700) until the range of values will fit the available display columns (690). The first marker value is next set

The operator is finally queried as to whether he would like to see the EOQ demonstration on another part number (1090). If "yes" the program repeats from line 220. If "no" the operator is instructed to press "ENTER" to terminate the program (1100). The "DATA" statements complete the program (1120-1140).

The program details are well described with PRINT, INPUT and REM statements throughout that should make it easy to understand and follow.

equal to the marker interval (710). The remaining X markers are then calculated and printed (720). The process is then repeated for the X axis (740-800). Finally, the frame for the graphics is completed (820-830).

The three superimposed plots of order costs, carry costs and total annual cost are now executed (840-1010). They are executed sequentially for clarity, not for efficiency. A "FOR-NEXT" loop is established (840) to generate a pointer to direct the program to the appropriate sub-routine. A nested loop then increments the value of X across the X axis (850). X = I-1,999 rather than I-12 to avoid a subsequent division by zero. The approximation is adequate for the purposes of the display. Three subroutines (860-890; 900-930; 940-980) then calculate the corresponding Y value and convert it to the equivalent Y set point value. If set point maximum X and Y values (990-1000) before proceeding to set the X,Y points that plot the graph (1010). When all three lines have been plotted, the precise values of EOQ and total annual cost at EOQ are printed at the top of the screen (1020-1030). Since an endless loop is created to permit uninterrupted viewing of the full screen (1080), a flashing message is printed on the screen directing the operator to "BREAK," then "GO TO 1090" to proceed (1050-1070).

Application

The tabular and graphic demonstrations of EOQ optimality are essentially tutorial. Therefore, for many business installations, the program might well be truncated after line 390, except for data statements, retaining only the decision-making routines and the necessary data. Some business users may also prefer to access existing files for annual requirements. DATA statements will be suitable for many, however, since the program is likely to be run only infrequently in an off-line mode in many instances. The program with the three data statements, leaves 9985 bytes of memory, with the Keyboard Debounce program loaded first. This should permit entering about 450 six-character part numbers in a 16K machine. Of course some firms may wish to treat carrying cost as a constant rather than an operator input variable. And, hard copy print routines will be needed in most cases. Such changes should be simple for most programmer/users. □

That's a tough one—beats the hell out of me.

Part Number 42831

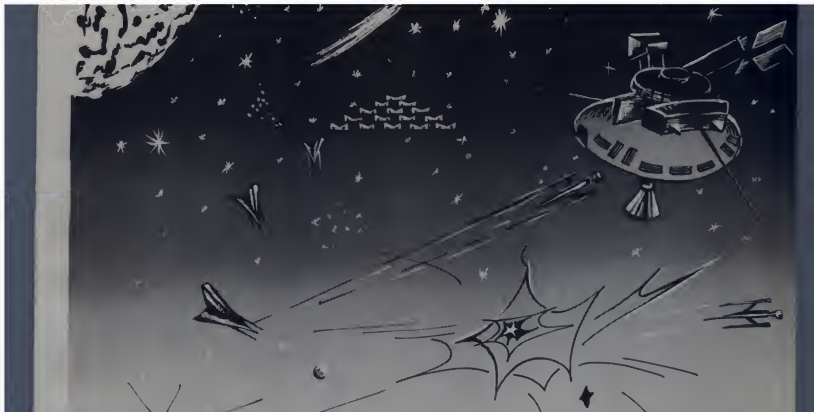
Yrly. Total

Order Quantity	All Costs	Order Costs	Carry Costs
24	74.1	46.5	27.6
28	72.05	39.85	32.2
31 EOQ	71.65	36	35.65
34	71.92	32.82	39.1
37	71.71	30.16	42.55

Figure 5.

Program Listing

```
10  REM** * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * **
20  REM**              ECONOMIC ORDER QUANTITY (EOQ)                     **
30  REM**                          BY                                    **
40  REM**                    WM. M. LOWERRE JR.                          **
50  REM**                     OCTOBER 19/79                              **
60  REM** * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * **
70  REM*                    TABLE OF VARIABLES                           *
80  REM*                    -----------------                            *
90  REM* PN = PART NUMBER          RA = ANNUAL UNIT REQUIREMENTS          *
100 REM* CU = UNIT COST             CO = COST TO ORDER                     *
110 REM* CCR = CARRY COST RATE      EQ = ECONOMIC ORDER QUANTITY           *
120 REM* MS = MONTHS SUPPLY         ADD = ANNUAL DOLLAR REQ'MENTS          *
130 REM* Q = ORDER QUANTITY         AO = ANNUAL COST TO ORDER              *
140 REM* AC = ANNUAL COST TO       TC = TOTAL ANNUAL COST AT EOQ          *
150 REM*       CARRY               TAC = TOTAL ANNUAL COST ANY Q          *
160 REM* R- = RANGE OF SCALE       MI = MARKER INTERVAL                   *
170 REM* MV = MARKER VALUE                                                *
180 REM* * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * **
190 DEFINT B,J
200 CLS: PRINT "THIS PROGRAM CALCULATES ECONOMIC ORDER QUANTITIES, AND
DEMONSTRATES OPTIMALITY OF THE SOLUTION."
```



NEW EXCITING SOFTWARE FOR YOUR SORCERER

SCREEN GENIE

Is a compact machine language program which can be loaded along with BASIC or Z-80 application programs. By adding only a few command poke statements to your program, and with no changes to logic or print statements, GENIE gives your application program all these applications: A 'PRINT AT' Feature to Sorcerer. Selective machine speed areas of any row or rows of the display. Scrolling normal output through any portion of the screen, to provide a 'TEXT WINDOW' ability. Black on White (INVERTED) printing. Switch it on and off at will to highlight text, a word, or a single character. Print indentation by re-defining the left margin. Select suppression of any character on output. All functions are compatible and switchable. You can use them intermixed, and it's easy to add in GENIE features to any existing program. SCREEN GENIE comes with DEMO, a complete learn-by-example program which shows off every one of GENIE's commands in working Basic language routines, including CAI learning, PRINT USING emulation, and even game animation and scoring.

$15.95

GALAXIANS

Your space ship has encountered an army of Galaxians whose mission is to destroy you. Blast them with lasers, but beware, they dive at you with ever increasing fury! Your Sorcerer's unique high resolution graphics add to the arcade like excitement that this game generates.

$19.95

SORCERER INVADERS

By far the best Space Invader game you'll ever have seen on any micro-computer, regardless of make or type! You'll never get your Sorcerer back from your kids with this running! SORCERER INVADERS is proving to be most popular and is similar to the arcade game but without the coin slot! Simply a must!

$15.95

'LUNA LANDER'

Land your craft on the moon in real-time, but be careful to land softly — otherwise you'll see your LANDER crumple before your very eyes! This is by far the best LUNA LANDER you'll ever have played. Requires 16K.

$11.50

SYSTEM 3

Toolkit for Sorcerer ROM PAC Basic. A word-processor type editor, allowing program statements up to 250 characters long and includes the following commands: EDIT a, b, AUTO a, b, REN a, b, c, d, DEF a, b, OLD, MERGE, CLOAD?, VAR, LIST a, b, DEL a, b, FIND CTRL-P, TRON, TROF, CLOSE and many more.

$29.95

BASIC TUTORIAL PACKAGE

A set of 9 tutorial programs that teach Sorcerer Basic to the NOVICE. This package has taught children of computer enthusiasts, parents of computer enthusiasts, wives of computer enthusiasts, husbands of computer enthusiasts, friends of computer enthusiasts, visitors to computer enthusiasts and even computer enthusiasts themselves! Learn by doing, with these lightly written, entertaining and humorous tutorials. Suitable for anyone who can read, regardless of age or prior computer knowledge. Let your Sorcerer teach you!

$24.95

MACHINE CODE TUTORIAL PACKAGE

A set of 8 tutorial programs fashioned after the BASIC TUTORIAL PACKAGE. This package is designed to show the BASIC programmer what to do with his Sorcerer after typing BYE. Learn Z-80 machine code programming and how to really use your Sorcerer with these easy-to-understand, lightly written, learn-by-doing tutorials. If you can program in BASIC and want to use machine code subroutines effectively, this package is for you! Covers such topics as: Monitor Commands; most Z-80 instructions; Hex-Binary-Decimal conversions; RAM and ROM; Source and Object Codes; Assembly Language; Hand Coding; Video and Keyboard Routines; Input and Output; Vector Manipulation; Memory Maps; Video and Screen RAM; Graphics and DMA; Cursor Control; Monitor and BASIC work areas; Spacial purpose 'GO' addresses of the monitor and BASIC ROM PAC; Storage and Linking of BASIC programs; parallel and Serial Interfacing; Cassette Routines; No-Stop Keyboard Input; disenabling CTRL C and ESC; and much more. In fact, everything you ever wanted to know about your Sorcerer, but didn't know where to look! What more could you ask for?

$24.95

SYSTEM SOFTWARE

1 Kent Street, Bicton, Western Australia, 6157. Telephone (09) 339 3842

HOW TO GET IT:

Phone or write to the above address. Bankcard, Master Charge, Visa, Money Orders and personal cheques accepted (expiry date and number of credit card required). Add $2.00 for handling and airmail postage. Ask about our mailing service. Dealer enquiries invited.

CIRCLE 232 ON READER SERVICE CARD

Quantity, continued...

```
210 PRINT: PRINT"THE FOLLOWING INVENTORY WILL BE USED:": GOTO230
220 CLS: PRINT"TO SEE OPTIMALITY DEMONSTRATED ON ANOTHER PART NUMBER, SELECT  A
NOTHER PART NUMBER FROM THE INVENTORY TABLE BELOW, OR ENTER 0": B=1: REM DIFFERE
NT ROUTE AFTER FIRST PART NUMBER
230 PRINT:PRINT"PART NUMBER","UNITS ROD YRLY","UNIT COST","ORDER COST"
240 PRINT"----------","----------","----------","----------"
250 RESTORE
260 READ PN,RA,CU,CO
270 IF PN=0 GOTO 290: REM NO MORE PART NUMBERS
280 PRINT PN,RA,CU,CO: GOTO 260
290 PRINT: IF B=1 INPUT"PART NUMBER OR 0"; A: GOTO 440: REM DIFFERENT ROUTE AFTE
R FIRST PART NUMBER
300 IF B=0 PRINT: INPUT "HOW ENTER THE INVENTORY CARRYING COST RATE"; CCR
310 CLS: PRINT "PART NUMBER","YRLY # REQ","ECON ORD QUANT","MONTHS SUPPLY"
320 PRINT "----------","----------","----------","----------"
330 RESTORE
340 READ PN, RA, CU, CO
350 IF PN = 0 THEN 390: REM NO MORE ORDER QUANTITY CALCULATIONS
360 LET EQ = INT(SQR(2*RA*CO/(CU*CC))): MS = INT(100*EQ*12/RA)/100: ADD = INT(10
0*RA*CU)/100: REM CALCULATE AND ROUND TO TWO DECIMAL PLACES
370 PRINT PN, ADD, EQ, MS
380 GOTO 340
390 PRINT: PRINT "THE COMPUTER HAS CALCULATED THE ANNUAL REQUIREMENTS IN DOLLARS
  AND THE ECONOMIC ORDER QUANTITY(EOQ), AND HAS CONVERTED THE EOQ INTO MONTHS SU
PPLY."
400 IF B=1 GOTO 430
410 PRINT: INPUT "IF YOU WISH TO SEE THE EOQ OPTIMALITY DEMONSTRATED, ENTER A PA
RTNUMBER.  IF NOT ENTER 0"; A
420 GOTO 440
430 PRINT: INPUT"DO YOU WISH TO SEE OPTIMALITY DEMONSTRATED? Y OR N"; A$: IF A$=
"N" LET A=0
440 IF A = 0 GOTO 1110
450 RESTORE: REM SEARCH FOR REQUIRED PARTNUMBER
460 READ PN, RA, CU, CO
470 IF PN = 0 THEN 410
480 IF PN <> A THEN 460
490 CLS: PRINT "PART NUMBER"; PN
500 PRINT "--------------------"
510 PRINT TAB(32) "YEARLY TOTAL"
520 PRINT "ORDER","----------------------------------------"
530 PRINT "QUANTITY","ALL COSTS","ORDER COSTS","CARRY COSTS"
540 PRINT "--------","----------","----------","----------"
550 LET EQ = SQR(2*RA*CO/(CU*CC)): REM CALCULATE RANGE OF ORDER QUANTITIES AROUN
D EOQ
560 FOR I = .8 TO 1.2 STEP .1
570 Q = (100*INT(I*EQ)/100): AO = (INT(100*CO*RA/Q)/100): AC = (INT(100*CU*CC*Q/
2)/100): TAC = AO + AC
580 IF Q = 100*INT(EQ)/100 PRINT Q; "EOQ", TAC, AO, AC: LET TC=TAC: GOTO 600
590 PRINT Q, TAC, AO, AC
600 NEXT I
610 PRINT: PRINT "NOTE: CARRY COSTS INCREASE; ORDER COSTS DECREASE; TOTAL COSTS
  DECREASE THEN INCREASE WITH ORDER QUANTITY."
620 PRINT: INPUT"DO YOU WISH TO SEE OPTIMALITY SHOWN GRAPHICALLY? Y OR N"; A$: I
F A$="N" GOTO 220
630 CLS: RX=2*EQ: REM SO EOQ WILL APPEAR AT MIDPOINT OF X RANGE
640 RV=2*TC: REM SO TAC MIN WILL OCCUR AT MIDPOINT OF Y RANGE
650 PRINT@965,"0";
660 FOR X=11 TO 127: SET(X,43): NEXT X: REM DRAW X AXIS
670 FOR X=11 TO 117 STEP 10: SET (X,44): NEXT X: REM SET X MARKERS
675 PRINT@ 1020,"0";
680 XI=1: REM ESTABLISH X MARKER INTERVALS
690 IF RX<10.6 GOTO 710
700 RX=RX/2: XI=2*XI: GOTO 690
710 MU=XI: REM FIRST X MARKER VALUE EQUALS X INTERVAL
720 FOR X=1 TO 10: PRINT@(963+(X*5)),MU;: MU=MU+XI: NEXT X: REM PRINT X MARKER V
ALUES
740 FOR Y=0 TO 44: SET(11,Y): NEXT Y: REM DRAW Y AXIS
750 FOR Y=7 TO 43 STEP 6: SET(10,Y): NEXT Y: REM SET Y MARKERS
755 PRINT@ 1,"$";
760 YI=1: REM ESTABLISH Y MARKER INTERVAL
770 IF RV<7.5 GOTO 790
780 RV=RV/2: YI=2*YI: GOTO 770
790 MU=YI
800 FOR Y=1 TO 7: PRINT@(64+2*Y), (7-Y)*YI;: NEXT Y: REM PRINT Y-MARKER VALUES
820 FOR X=12 TO 127: SET (X,0): NEXT X: REM COMPLETE FRAME
830 FOR Y=0 TO 43: SET(127,Y): NEXT Y
```

We know the Atari 800.

The experts at ComputerLand would like you to meet the computer that leads two lives. By day, the Atari 800 is a hard-working business tool. By night, it's a stimulating educator and fascinating entertainer.

On the job, the Atari 800 is a management tool. It can help you plan and control by providing timely reports on accounts payable and receivable, inventory control, and a wide array of other business and financial management functions.

At home, it can teach more than 15 separate subjects, from Accounting and Algebra to U.S. History. It's a video blackboard that teaches, asks questions, then tells you if you have the right answers, so you learn at your own pace. It can also turn your TV set into a playground for some of the most challenging and enjoyable computer games you've ever played. And help run your household—manage your budget, balance the checkbook, keep tax records, analyze investments, even organize your recipe file.

The Atari 800 is the heart of a whole family of computer peripheral equipment and accessories including Atari's unique plug-in Memory Modules. So it can grow as your needs and interests grow. It's fully programmable and comes equipped with the Atari 800 Basic Language Cartridge. But with all its sophistication, the Atari 800 is simple, even for people who have never used a computer before.

Let us introduce you.

Stop by ComputerLand and get a thorough introduction to the computer that leads two lives.

It could enrich your own life.

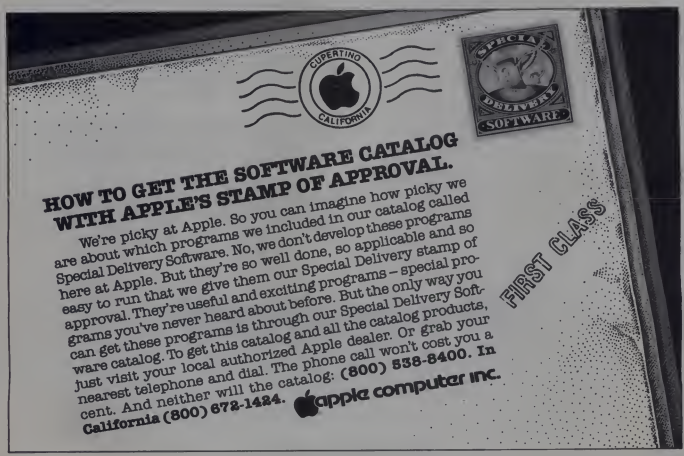
ComputerLand

Over 150 stores worldwide.
For the stores near you, call (800) 227-1617 ext. 118.
From California call (800) 772-3545 ext. 118.
From Hawaii and Canada call collect (415) 930-0777.
In Europe call Luxembourg 43-54-55.

CIRCLE 139 ON READER SERVICE CARD

Quantity, continued...

```
840 FORJ=1 TO 3: REM PLOT 3 SUPERIMPOSED GRAPHS
850 FOR I=12 TO 127: X=(I-11.999)/10*XI: ON J GOTO 860,900,940
860 PRINT@212,"PLOT ANNUAL ORDERING COST";: REM ESTABLISH Y SET VALUES FOR AO
870 AO=CO*RA/X
880 V=INT(43-6*AO/VI): REM Y SET POINT ANNUAL ORDER COST
890 GOTO 990
900 PRINT@212,"                              ";: PRINT@276,"PLOT ANNUAL CARRYING COST
";: REM ESTABLISH Y SET VALUES FOR AC
910 AC=CU*CC*X/2: REM Y SET POINT ANNUAL CARRY COST
920 V=INT(43-6*AC/VI)
930 GOTO 990
940 PRINT@276,"                              ";: PRINT@340,"PLOT TOTAL ANNUAL COST (T
AC)";: REM ESTABLISH Y SET VALUES FOR TAC
950 AO=CO*RA/X
960 AC=CU*CC*X/2
970 TAC=AO+AC
980 V=INT(43-6*TAC/VI)
990 IF V<0 THEN V=0: REM CONSTRAINS V VALUES TO GRID
1000 IF V>44 THEN V=44
1010 SET(I,V): NEXT I,J: REM PLOTS GRAPHS
1020 PRINT@82,"EOQ =";INT(10*EQ)/10;:REM GIVES VALUES NOT DETERMINABLE FROM GRA
PH
1030 PRINT@97,"MIN TAC = $";TC;
1040 PRINT@214,"(BREAK  THEN  GOTO 1090 ";: REM HOW TO EXIT GRAPH AND CONTINUE
1050 FOR X=1 TO 500: NEXT X: REM FLASHES LINE @ 214
1060 PRINT@214,"                             ";
1070 FOR X=1 TO 300: NEXT X
1080 GOTO1040
1090 CLS: INPUT"DO YOU WISH TO SEE OPTIMALITY DEMONSTRATED ON ANOTHER PART
NUMBER? Y OR N"; A$
1100 IF A$="Y" THEN GOTO 220
1110 PRINT: INPUT"PRESS <ENTER> TO TERMINATE PROGRAM"; A
1120 DATA 428301,200,5.75,5.58
1130 DATA 428302,462,32.76,10.05
1135 DATA 428303,311,10.00,30.00
1140 DATA 0,1,1,1
```



CUPERTINO
CALIFORNIA
SPECIAL
DELIVERY
SOFTWARE
HOW TO GET THE SOFTWARE CATALOG
WITH APPLE'S STAMP OF APPROVAL.
We're picky at Apple. So you can imagine how picky we are about which programs we included in our catalog called Special Delivery Software. No, we don't develop these programs here at Apple. But they're so well done, so applicable and so easy to run that we give them our Special Delivery stamp of approval. They're useful and exciting programs – special programs you've never heard about before. But the only way you can get these programs is through our Special Delivery Software catalog. To get this catalog and all the catalog products, just visit your local authorized Apple dealer. Or grab your nearest telephone and dial. The phone call won't cost you a cent. And neither will the catalog: (800) 538-8400. In California (800) 672-1424.
apple computer inc.
FIRST CLASS

In which we sell a 386 page, $11.95 book for just 2¢.

Liquidation Giveaway

Byte magazine. You've seen it. It's the fat technical one.

Back when *Byte* was first publishing independently, *Creative Computing* and *Byte* cooperated in many areas. We ran joint promotions, directed articles to each other and the like.

In 1976, Creative published *The Best of Creative Computing, Volume 1*. I proposed to Virginia Londoner, publisher of *Byte*, that we also publish articles from *Byte* in book form. She agreed, and so we published *The Best of Byte, Volume 1*. It's a huge book of 386 pages with articles on hardware, software, technical tutorials, how-to materials and even some philosophy.

Although some of the technical material in *The Best of Byte* is out of date today, it nevertheless provides a good historical framework for the personal computing field. Not at all out of date are most of the software articles and tutorials. Similar books of other publishers are selling for $20 and up, so at $11.95, this one is quite a bargain.

Big Hearted

About the same time we were preparing *The Best of Byte* for publication, Nat Wadsworth of Scelbi approached Byte about doing a similar book. Virginia wanted to be nice to everyone, so she gave permission. Thus was born the *Scelbi-Byte Primer*.

Unfortunately, about half of the content of the two books was identical. Thus *Byte* was faced with a dilemma of which book to endorse and sell through their magazine. Inexplicably, they chose the Scelbi book. Thus we were left with twelve skids of *The Best of Byte*.

Hidden Away

In the next three years we sold a lot of these books. In fact, after we ran a special in 1979, we thought we had sold out.

However, we just moved to new quarters. In the move we found, lurking away in the back of our old garage, four skids of *The Best of Byte*. After some fitting words, the boss said "for 2¢, I'd give them away." So that's what we're doing.

Our Ridiculous Offer

The original price of *The Best of Byte* was $11.95. If you order $11.95 worth of any of our other books or records, we'll throw in *The Best of Byte* for 2¢.

Thus you could order *The Best of Creative Computing, Vol. 3* ($8.95) and *Computer Coin Games* ($3.95). The toal price is $12.90. For $12.92 you also get *The Best of Byte*. Shipping and handling on all book orders is $2.00.

Here are the books you can use to come up with an $11.95 or greater total:

Best of Creative Computing, Vol. 1	$8.95
Best of Creative Computing, Vol. 2	8.95
Best of Creative Computing, Vol. 3	8.95
Basic Computer Games	7.50
More Basic Games (Microsoft)	7.95
More Basic Games (TRS-80)	7.95
Computer Coin Games	3.95
Be A Computer Literate	3.95
Computers in Mathematics	15.95
Problems for Computer Solution (Student)	4.95
(Teacher)	9.95
Computers in Society Bibliography	17.95
Katie and the Computer	6.95
Computers For Kids (TRS-80)	3.95
Computers For Kids (Apple)	3.95
Tales of the Marvelous Machine	8.95
Colossal Computer Cartoon Book	4.95
Computer Rage Game	8.95
Computer Music Record	6.00

2¢

Limited Supply

We expect a heavy response to this offer, so order today to be sure of getting *The Best of Byte* for just 2 cents.

Send us your order for books of $11.95 or greater plus 2¢ for *The Best of Byte* and $2.00 postage handling. Send payment or Visa, MasterCard or American Express number and expiration date to the address below or call our toll-free number.

Don't delay; order today.

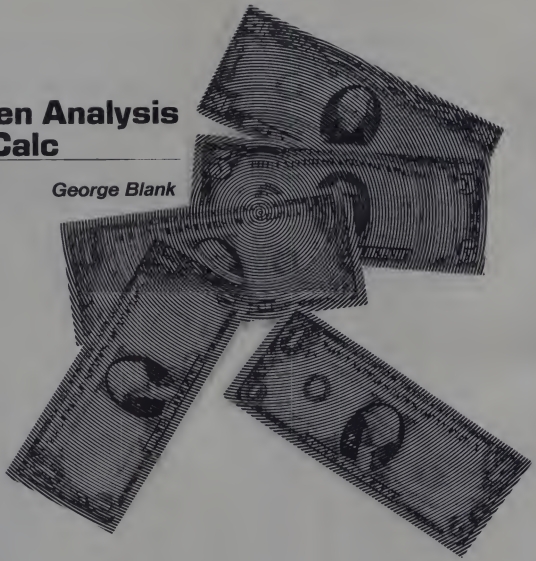
creative computing

P.O. Box 789-M
Morristown, NJ 07960

Toll-free **800-631-8112**
(In NJ 201-540-0445)

Break Even Analysis with VisiCalc

George Blank



VisiCalc, from Software Arts, is much more than a business application for microcomputers. I like to think of it as a financial language for microcomputers, and it has a major advantage over other languages. Since the authors, Dan Bricklin and Bob Frankston, were careful to make each version compatible with the other versions, a data set that will work in one version will work in all the other versions without change. VisiCalc is currently available for the TRS-80 Model I and Model III, PET, CBM, Apple II, Atari 800, and HP-85.

The authors have also come up with a standardized data format that can be dumped directly from the computer to a printer. All you have to do to print out the data set is to save the file to the printer, using this set of commands:

```
/S
S
:P (ENTER)
```

The output will be a file such as the one included in this article. Since all data is in ASCII, I then read my VisiCalc file into the Electric Pencil word processor on my Radio Shack computer, and edit it for publication. Unfortunately, it does not work with Scripsit, as Scripsit interprets the greater than symbol as a format command, and prints an error message when it comes to a VisiCalc line.

The file is produced in reverse order, so that it is easiest to enter it into your computer by starting at the bottom and working to the top.

Commands are preceded by a slash, (/), and program lines by a greater than symbol and the letter and number of the cell where the information belongs. For example,

```
" A1:" Break Even
```

tells the computer to put "Break Even" in cell A1. Once you can do that, all you have to do is figure out how to use the Replicate command efficiently to enter the material into your own VisiCalc file.

Although I have versions of VisiCalc for the Apple, Atari, and TRS-80, I use the TRS-80 version exclusively. I much prefer the wider screen width (64 characters) and sharper letters from the black and white monitor. The TRS-80 version has several other advantages. It is cheaper at $99 than the $150 for the Apple version and $199 for the Atari version. Unlike the other versions, it is not copy protected, so I can put a copy of the program on each data disk. I have well over 100 diskettes, and I don't like hunting for individual ones when I can help it. I like the ability to modify my files with a good word processor such as Scripsit. In addition, the Model III, with its double density disk drives, offers more storage on each diskette.

Now for the Break Even Analysis program, which I hope is the first of many VisiCalc applications to appear in *Creative Computing*. As you enter the retail price and cost information, the program is set up to calculate the return on various quantities of goods sold. You can see the effects of changing your wholesale discount, spending more on advertising, reducing material and labor costs, or making other changes to your product strategy. You may also want to change the labels on the various fixed and variable cost categories to suit your own product.

Components Express, Inc.

"Have you kissed your computer lately?"

1380 E. Edinger, Unit CC
Santa Ana, CA 92705
(714) 558-3972

Vista "V-DRIVE"

THE LAST WORD IN 8" FLOPPY DISK ENCLOSURES

The Vista V-1000 Floppy Disk Drive Subsystem

- Delvec chassis with external slide assy access for drive positioning and mounting ● Built to mechanically and electrically accomodate single sided drives– including the most popular 8-inch Winchester and Shugart floppy disk drives and 8-inch streaming tape units ● Storage capacity from 0.5 to 40 megabytes ● Industrial quality cabinet with the cast front bezel ● Meets all UL and CSA/A standards ● Additional Savings! Front and rear retma rail mounts provided at no extra charge on external sides! ● Desk or rack mountable ● Features modular construction with removable sub-assembly that allows easy cabinet positioning and mounting ● Timers pull out for easy service and maintenance

CABINET	$ 395.00
CABINET with (2) single sided drives (includes power supply and cables)	$1595.00
CABINET with (2) double sided drives (including power supply and cable)	$2295.00

ROLL YOUR OWN SUB!

Qume DATATRAK 8

- EASY ● 8" (1.6 MBYTE) DISC LIFE
- 240 KB FIELD SERVICEABILITY
- IMPROVED DATA RELIABILITY
- IBM COMPATIBILITY
- WRITE PROTECT CAPABILITY
- ACTIVITY LIFE INDICATOR

QUME DATATRAK 8	$689.95each
BUY 2 FOR 545.95 EACH	
SHUGART SA801 SINGLE SIDED	395.00
SHUGART SA851 DOUBLE SIDED	595.00
SIEMEMS FD100-8 SINGLE SIDED	375.00

Vista V-80

5¼" DISK

2 DRIVE CABLE 39.95 2 for 279.00 ea.
4 DRIVE CABLE 39.95

NOW SAVE ON TRS 80 ADD-ON ONLY $299.00

RS232 CONNECTORS
DB 25P
DB 25S
HOOD CLAMSHELL
6.99/SET

2708	2716	LM 340K-12
450NS	350NS	LM 320K-5
5.95 each	9.25 each	.85 each
5/5.50 each	5/8.95 each	

IMSAI 8-100
WIREWRAP CONNECTORS
3.95 each
5/17.95 each

4116 ADD-ON (200NS)
(APPLE, TRS 80, HEATH, EXIDY, ETC)
8 FOR 36.95
8 FOR 45.95 (150NS)

32K STATIC RAM BOARD

S-100

16K 4MHz KIT	159.95
16K 4MHz AAT	217.95
32K 4MHz KIT	289.95
32K 4MHz AAT	348.95

MPI

HIGH PERFORMANCE 5¼" DRIVES

- PATENTED STEPPERBAND POSITIONER
- INDUSTRY'S LOWEST CARRIAGE
- PROPRIETARY SWITCH AND DISKETTE EJECTOR
- LOW POWER CONSUMPTION
- ELECTRONICS PACKAGING FOR SINGLE PASS

CASE & POWER SUPPLY 80.95

MPI51	Single Head 40 Track	239.95	**MPI91** Double Head 40 Track 335.95
MPI52	Double Head 40 Track	335.95	**MPI92** 80 Track 475.95

TANDEM TM100-1 240.95
TANDEM TM100-2 DUAL HEAD 335.95
SIEMENS/WANGCO 82 259.95

MINIATURE COMPUTER

A COMPLETE COMPUTER

1K KIT	149.00
2K KIT	169.00
Manual	10.00

TOGGLE SWITCH
SINGLE POLE
DOUBLE THROW
C&K .49 each

CH MOM SWITCH
SINGLE POLE/
DOUBLE THROW
.95 each

CENTRALAB CARBON POT 20K .39 each

CLOCK COUNTER
MECO BCC Thumbwheel
Switch with Two Tubes
2.25 each

SPECIALS OF THE MONTH!

8080A Quality Parts	
AM 2708 PROM 5.0v Multiplexed	8.95
AM 2716 PROM 5.0v Multiplexed	19.95
8K/1K Dual Spec Ironsides 170ns	
AY-5-2376 Keyboard Encoder 64 Keys	10.50
AY-5-3600 Keyboard Encoder 80 Keys	12.50
1488 or 1489 Line Driver Pin over	95
1488 or 1489 Line Receiver Pin over	95
Motorola 6800 8 Bit MPU	19.95
LM3372 Adj. Neg. Volt Reg (1.2-37 - 1.5A)	1.95
18 Pin Low Profile Socket	08
22 Pin Low Profile Socket	08
24 Sol Low Profile Socket	08
40 Pin Low Profile Socket	10

IC SPECIALS

MICROPROCESSOR 8/16/24 IC'S			
Z-80 CPU	8.95	8400 CPU	8.15
Z-80A CPU	10.95	8402 SIO	19.95
Z-80B CPU	14.95	8500 CPU	9.95
Z-80H CPU	19.95	8502 SIO	24.95
MICROPROCESSOR SUPPORT IC'S			
8212	2.49	8253	2.90
8214	2.95	Z-80-PIO	8.95
8216	2.49	Z-80A-PIO	9.25
8224	2.25	Z-80-CTC	8.95
8228	2.25	Z-80A-CTC	9.25
8229	4.75	Z-80-DMA	24.95
8251	5.95	Z-80A-DMA	29.95
8253	5.95	8726	1.40
8255	5.95	8728	1.40
8257	19.90	8796	1.19
8259	19.90	8797	1.19
8410	4.75	8820	9.75
8411	4.75	8830	9.75
8251	5.95	8832	19.90
8250	4.75	8551	13.75
8253	19.90	74161	3.90
MEMORY & RAMS & PROMS & EPROMS			
2114 450 ns	2.50	2114 300 ns	2.95
2114L 450 ns	2.75	2114L 300 ns	3.25
4044-450 ns	4.00	5101 450 ns	2.95
4045	4.00	5101 300 ns	3.25
4116-150/200	2.50	5114 450 ns	7.95
AM 9016 CPC	2.50	5114 300 ns	8.95
8748	U.S. MPUS	8749	12.95
2102-450 ns	2.95	2716-450 ns	9.25
4200	5.95	2708-450 ns	3.50
SOUND GENERATORS			
AY-3-8910 Programmable Sound Generator			7.49
AY-3-8912 Or Second Source			
(Add $3.00 for manual) 64 Pgm			9.95
UARTS			
AY-5-1013A	3.50	AY-5-1013A	5.75
AY-5-1014A	8.90	TM1602A	2.50
LINEAR			
LM 301AH	.32	LM 3876-6	.99
LM 301AN	.32	LM 3900N	.59
LM 307N-8	.25	LM 3900W-14	.58
LM 308H	.75	LM 3909N-8	.99
LM 308H	.75	LM 1458CJ-14	.99
LM 308N-8	.75	LM 1496N-8	1.25
LM 309K	1.25	LM 1800CN	1.95
LM 3900 Series	1.35	RC 1556/MB-8	1.25
LM 3301 Series	1.35	RC 4136DCC	.95
LM 3240	4.95	CA 3130T	2.25
LM 3302N	1.25	CA 3401E-14	1.25
LM 3403N Quad	1.25	CA 3401E	1.21
LM 3900 Quad	.59	LM 1800CN	1.49

HOW TO ORDER Pay by check, money card, or C.O.D. Foreign pay in U.S. Funds. Orders by phone or mail. $100 minimum. Add $3.00 to total this total day or cover date. Shipping: Orders under 5 lbs. add $3.00 for UPS. Orders over 5 lb. Foreign - Add 10% for shipping and handling C.O.D. add 1.50. Guaranteed to be free from defective parts. We reserve the right to add quantities limits. All prices subject to price spec. We are not responsible for typos. SEND FOR OUR FREE PLITER Open 10AM-7 complete list of 74LS00 IC's

Vista VISTA COMPUTER COMPANY
1317 E. EDINGER
SANTA ANA, CA 92705

APPLE™ 40 CHARACTER TYPE-AHEAD BUFFER

ACTUAL SIZE **$49.95** **MODEL 150**

- UP TO 40 CHARACTER TYPE-AHEAD CAPABILITY.
- ENTER COMMANDS OR DATA WHILE YOUR APPLE™ IS PROCESSING PREVIOUS INSTRUCTIONS.
- COMPATIBLE WITH ALL APPLE™ COMPUTERS, KEYBOARDS AND SOFTWARE.
- INCLUDES COMPLETE INSTRUCTIONS FOR QUICK AND EASY INSTALLATION.
- NO CUTS - NO JUMPER - NO SOFTWARE PATCHES REQUIRED.

CONTACT YOUR LOCAL DEALER OR
VISTA COMPUTER CO. (800) 854-8017

ADVANCED COMPUTER PRODUCTS

FIRST TO OFFER PRIME PRODUCTS TO THE HOBBYIST AT FAIR PRICES!!!

1. **Proven Quality** Factory tested products only
2. **Guaranteed Satisfaction**
3. **Over $1,000,000.00 Inventory**

1981 CATALOG NOW AVAILABLE.

Send $2.00 for your copy of the most complete catalog of computer products.
A must for the serious computer user

DISKETTE SALE

Verbatim Datalife		Maxell
5¼" Singleside, Double Density, 40 track		
MD525	24.95 box	MD-1 Soft Sector 29.95 box
Specify 1, 10, 16 sector		MH-1 16 Hard Sector 29.95 box
5¼" Double Side, Double Density, 40 track		
MD550	34.95 box	MD 2 Soft Sector 39.95
Specify 1, 10 or 16 sector		MH-2 16 Hard Sector 39.95 box
8" Single-Side, Double Density		
FD34-9000	34.95 box	FD1-128 34.95

SAVE 40%
on our Diskette Head Cleaning Kit.

Send this Coupon with your disk order and receive the Cleaning Kit for

A regular $30.00 value
Specify 5¼" or 8"
$18.95

SAVE 50%
on our Binder Storage Pages and Disk Binders

Send this Coupon with your disk order and receive the Disk Binder and 10 disk storage pages for

A regular $18.95 value
Specify 5¼" or 8"
$9.95

RETAIL STORES OPEN NOW-SAT
STORE #1 1310 "B" E. Edinger, Santa Ana, CA 92705
Showrooms, Retail, Warehouse
STORE #2: 674 El Camino Real, Tustin, CA 92680
Specializing in Systems
STORE #3: 542 W. Trimble Road, San Jose, CA 95131
(408) 946-7010

P.O. Box 17329, Irvine, CA 92713
Direct Order Lines:
(714) 558-8813 (800) 854-8230 (800) 854-8241

FOR INTERNATIONAL ORDERS:
1310 E. Edinger (714) 953-9684
Santa Ana, CA 92705 TWX: 910-595-1505

CIRCLE 146 ON READER SERVICE CARD

Break Even, continued...

Special Notes

The Replicate command can make it much easier to enter this program. Column C is replicated from C3 to C31 by keeping +C3 Relative and +B18 with No change. Column D is replicated by answering Relative to +C2 both times (beginning and end of the line), and answering No change to B3, B19, B9, and B16. In both cases, it is assumed that you will begin at the bottom of the listing and enter squares C2, C3 and D2 before the others in the columns.

It would even be possible to type in this program using a word processor like Scripsit, save it to disk, and read it into the VisiCalc. All you would have to do is end each line with a carriage return, and save it using the extension /VC so that VisiCalc can read it. □

```
"D31:+C31+B3*(.01*(100-B19))-(B9+(B16*C31))
"C31:+C30+B18
"D30:+C30+B3*(.01* 100-B19))-(B9+(B16*C30))
"C30:+C29+B18
"D29:+C29+B3*(.01*(100-B19))-(B9+(B16*C29))
"C29:+C28+B18
"D28:+C28+B3*(.01*(100-B19))-(B9+(B16*C28))
"C28:+C27+B18
"D27:+C27+B3*(.01*(100-B19))-(B9+(B16*C27))
"C27:+C26+B18
"D26:+C26+B3*(.01*(100-B19))-(B9+(B16*C26))
"C26:+C25+B18
"D25:+C25+B3*(.01*(100-B19))-(B9+(B16*C25))
"C25:+C24+B18
"D24:+C24+B3*(.01*(100-B19))-(B9+(B16*C24))
"C24:+C23+B18
"D23:+C23+B3*(.01*(100-B19))-(B9+(B16*C23))
"C23:+C22+B18
"D22:+C22+B3*(.01*(100-B19))-(B9+(B16*C22))
"C22:+C21+B18
"D21:+C21+B3*(.01*(100-B19))-(B9+(B16*C21))
```

```
"C21:+C20+B18
"D20:+C20+B3*(.01*(100-B19))-(B9+(B16*C20))
"C20:+C19+B18
"D19:+C19+B3*(.01*(100-B19))-(B9+(B16*C19))
"C19:+C18+B18
"B19:50
"A19:"Discount Given (%)
"D18:+C18+B3*(.01*(100-B19))-(B9+(B16*C18))
"C18:+C17+B18
"B18:100
"A18:"Quantity Increment
"D17:+C17*B3*(.01*(100-B19))-(B9+(B16*C17))
"C17:+C16+B18
"D16:+C16*B3*(.01*(100-B19))-(B9+(B16*C16))
"C16:+C15+B18
"B16:@SUM(B12...B15)
"A16:"TOTAL VARIABLE COST
"D15:+C15*B3*(.01*(100-B19))-(B9+(B16*C15))
"C15:+C14+B18
"B15:0
"A15:"Other
"D14:+C14*B3*(.01*(100-B19))-(B9+(B16*C14))
"C14:+C13+B18
"B14:0
"A14:"Packaging
"D13:+C13*B3*(.01*(100-B19))-(B9+(B16*C13))
"C13:+C12+B18
"B13:0
"A13:"Materials
"D12:+C12*B3*(.01*(100-B19))-(B9+(B16*C12))
"C12:+C11+B18
"B12:0
"A12:"Labor
"D11:+C11*B3*(.01*(100-B19))-(B9+(B16*C11))
"C11:+C10+B18
"B11:" (Per Unit)
"A11:"VARIABLE COSTS
"D10:+C10*B3*(.01*(100-B19))-(B9+(B16*C10))
"C10:+C9+B18
"D9:+C9*B3*(.01*(100-B19))-(B9+(B16*C9))
"C9:+C8+B18
"B9:@SUM(B6...B8)
"A9:"TOTAL FIXED COST
"D8:+C8*B3*(.01*(100-B19))-(B9+(B16*C8))
"C8:+C7+B18
"B8:0
"A8:"Other
"D7:+C7*B3*(.01*(100-B19))-(B9+(B16*C7))
"C7:+C6+B18
"B7:0
"A7:"Marketing
"D6:+C6*B3*(.01*(100-B19))-(B9+(B16*C6))
"C6:+C5+B18
"B6:0
"A6:"Development
"D5:+C5*B3*(.01*(100-B19))-(B9+(B16*C5))
"C5:+C4+B18
"B5:" (Totals)
"A5:"FIXED COSTS
"D4:+C4*B3*(.01*(100-B19))-(B9+(B16*C4))
"C4:+C3+B18
"D3:+C3*B3*(.01*(100-B19))-(B9+(B16*C3))
"C3:+C2+B18
"B3:0
"A3:"Retail Price
"C2:+C2+B3*(.01*(100-B19))-(B9+(B16*C2))
"C2:+B18
"A2:"Product Name:
"D1:"Profit or Loss
"C1:"Units Sold
"B1:"Analysis
"A1:"  Break Even
/W1
/GOC
/GFH
/GC14
"A1:"A1:
```

Let your customers know that you mean business - show with

Comp-U-Con

The schedule of shows will be **1981**

1 Cleveland, Ohio — August 14-16
2 Milwaukee, Wisconsin — August 20-23
3 St. Paul, Minnesota — September 9-11
4 Detroit, Michigan — September 24-26
5 Pittsburgh, Pennsylvania — October 1-3
6 St. Louis, Missouri — October 15-17
7 Dallas, Texas — October 22-24
8 Los Angeles, California — November 8-10
9 San Francisco, California — November 19-21
10 Denver, Colorado — December 3-5

Comp-U-Con Company presents — 10 Home and Business Computer Festivals — From Coast to Coast.

These shows will be directed toward the home user/hobbiest and small businessman and will be promoted by a full scale publicly appealing package of inducements — such as speakers on subjects of particular interest to the targeted groups and a drawing for a $3000.00 computer system.

If your company has an interest in greatly increasing its sales this fall and does business within a 300 mile radius of any or all of the targeted cities. These shows are exactly what your looking for.

You may participate on two levels. You may either purchase Booth space, in which you can present and demonstrate your goods directly to the public, or you can purchase advertising space in each shows handout brochure that will be given to all that attend.

The average attendance is expected to range from 20,000 up to 35,000 people with additional information going out by mail to those who can't attend.

Please Call or Write today for complete details and costs. Write to — The Weston Research Institute, P.O. Box 175, Waverly, IA 50677 or **Call Jeff Weston, Collect at (319) 268-1953.**

Note - Because of limited space availability, an early reservation is recommended to assure you of space.

CIRCLE 127 ON READER SERVICE CARD

TREND 3

Short-Range Forecasting with a Small Computer

Hartley Jackson

Trend3 is a program to make short-range forecasts. Forecasts of the future can make the difference between profits and losses for business. They can also be for fun.

Statistical forecasting methods are based upon the assumption that the future is a function of the past. A good forecasting program ought to help us study the past and evaluate the forecasts produced by the program.

The classical time series model is composed of the long range trend; the cycle, such as the business cycle; seasonality; and random or irregular factors. It is generally conceded that no one can forecast irregular factors, so forecasting programs smooth the series to remove them. Seasonality can be taken out of time series using seasonal adjustment programs such as the Census X11, through 12-month moving averages, or through using annual data. We still need to study the combined trend-cycle for range forecasts.

Trend3 asks for 18 periods of data, but this can be changed by altering the constant P and the DIM statement.

Trend3 computes a smoothed trend-cycle estimate in two steps. It takes a 3-month moving average of the original data. Then it takes a 3-month moving average C of this average. The result is a smoothed estimate of the past trend cycle.

Using an exponential smoothing factor that you enter, Trend3 computes an exponential average. The exponential smoothing factor, must be greater than zero and less than one. Normally it is between 0.2 and 0.5. The larger the exponential smoothing factor, the less it will smooth the data, but the sooner it will show changes. If important changes are anticipated, the value of the smoothing factor should be increased so that predictions will respond quickly to whatever changes eventually do materialize. When a new pattern emerges you may want to decrease the smoothing factor.

By altering the smoothing constant you can better fit the exponential average to

```
                TREND3
  A program for short-range
  forecasts using exponential
  smoothing, by H. Jackson
  from CREATIVE COMPUTING

YOU WILL ENTER  18  PERIODS OF DATA.
MO          ORIGINAL        TREND           EXPONENTIAL
            SERIES          CYCLE           AVERAGE
 3 MAR          110             0               0
 4 APR          120             0               0
 5 MAY          130           130             120
 6 JUN          140           140             134
 7 JUL          150           150             147.2
 8 AUG          160           160             159.52
 9 SEP          170           166.667         167.856
10 OCT          180           176.667         177.713
11 NOV          190           184.444         186.484
12 DEC          190           193.333         191.691
13 JAN          170           190             179.215
14 FEB          180           188.333         181.529
15 MAR          200           196.667         192.117
16 APR          210           208.888         206.494
17 MAY          220           220             217.099
18 JUN          230           216.666         224.859
19 JUL          240           230             235.327
20 AUG          130           191.666         158.661

MO          TREND           EXPONENTIAL
                            PLUS TREND
 3 MAR          0               0
 4 APR          0               0
 5 MAY          5             140
 6 JUN          4.8           143.2
 7 JUL          4.83          148.72
 8 AUG          5.136         155.904
 9 SEP          5.494         164.763
10 OCT          5.904         173.446
11 NOV          5.129         172.384
12 DEC          4.029         167.509
13 JAN          3.463         171.048
14 FEB          4.163         175.808
15 MAR          4.924         187.321
16 APR          5.614         198.957
17 MAY          6.231         210.126
18 JUN          6.777         221.769
19 JUL          7.255         232.349
20 AUG          2.871         200.147
                            FORECAST
21 SEP                        203.018
22 OCT                        205.89
23 NOV                        208.761

MEAN  169.444  STANDARD ERROR  37.189
```

H. Jackson, 430 Sidney Street, Madison, WI 53703.

Find Your Way Around The New Apple® DOS With The Dakin5® Programming Aids 3.3®

Dakin5 Corporation, a Colorado software house, is making available to the public 12 utility programs on one 16 sector diskette, utilizing the new Apple DOS 3.3, which provides 23% more storage.

These menu-driven utilities will facilitate the development of your own microcomputer programs.

All of the **Dakin5 Programming Aids 3.3** programs are also compatible with the Corvus Disk Drive system.

This 12-in-1 set of utility programs accomplishes the following:

The Lister sends BASIC programs to the printer to be listed, utilizing the full line capacity of the printer. Pagination and page headings, including program name and date, are also provided as additional options.

The Line Cross Reference produces a display or a printed listing of all lines referenced by GOTO, THEN, GOSUB, LIST or RUN statements in an Applesoft BASIC program. Cross-referencing of most programs is done in a few seconds. An option allows you to print only the line numbers referenced in GOSUB statements.

The Variable Cross Reference creates a display or a printed listing of all variable names used in an Applesoft BASIC program, showing all line numbers where a given variable name is used.

The Peeker displays or prints either all or selected records from a text file.

The Patcher allows you to display any sector of a given file or program, and then to update any data within that sector. Another option permits you to specify the sector you wish to update such as directory sectors and sectors occupied by DOS.

The Copier copies absolutely ANY type of file or program on a normally formatted diskette from one diskette to another. The name of the program or file is the ONLY information needed.

The Calculator adds, subtracts, multiplies and divides very large numbers using numeric string data. The Calculator subroutine (using twenty place accuracy) is written in Assembler code, and runs much faster than an equivalent BASIC subroutine.

Apple is a registered trademark of Apple Computer Inc

The Diskette Copy is a diskette-to-diskette copy program that does more than just copy. First, the program verifies the input. Then it formats an output disk, copies each track, and checks that the output matches the input. Additional options allow you to either initialize a diskette without DOS, or to create a copy without DOS, thereby increasing storage by 32 sectors. You may even create a copy with a different volume number than the original.

The Array Editor is a simple word processor that allows you to create, modify, print and save your own text or EXEC files.

The Screen Printer permits contents of the text screen to be sent to the printer at any time the keyboard is active (i.e. the cursor is visible). This Screen Printer program remains in effect until you press RESET or "reboot" the system.

The Prompter is a data entry subroutine that handles both string and numeric data. You have the option of using commas, decimal points and leading zeros with right-justified numerics. Alphanumeric data is left justified with trailing spaces added as required. With the Prompter you are also able to specify maximum field length to prevent overflow in both numeric and alphanumeric fields. You can even define your own set of valid characters.

The Cruncher removes REM statements, unreferenced (dead) code, and compresses code in Applesoft programs. This will increase the speed of your programs; memory and disk space savings could be more than 45%.

Many of these utility programs have been developed and tested for in-house use while producing The Controller™ business package for Apple Computer Inc.

Each programming aids package includes a program diskette and very complete documentation, all attractively packaged in a padded, blue print vinyl 3-hole notebook with silver lettering. An identifying tab separates each program for convenient reference.

See your Apple dealer or contact Dakin5 Corporation, P.O. Box 21187, Denver, Colorado 80221. Telephone: 800-525-0463. Visa or MC welcome.

DAKIN5 CORPORATION

The Controller is a registered trademark of Dakin5 Corporation

CIRCLE 125 ON READER SERVICE CARD

your data. However, whatever the value of the smoothing constant, exponentially smoothed averages will always lag behind a steadily rising or falling trend. The result will be a cumulative error or bias in the prediction.

To correct for this error in the prediction you are asked to enter an exponential trend tracking factor. This trend tracking factor is just like the exponential smoothing factor, usually between 0.2 and 0.5. A larger trend tracking factor gives more weight to more recent data and responds more quickly to changes, but does not smooth the data as much. You can increase your understanding by experimenting with different factors.

The exponential average is computed by multiplying the new month by the smoothing factor. The previous exponential average is multiplied by one minus the smoothing factor. Then the two are added together to produce the new exponential average. A simple average is used as the initial exponential average.

You may find it interesting to make your own judgmental forecasts first to see if you can beat the computer model.

Trend3 computes a "trend" which is a smoothed estimate of the change between months. The change in the exponential average is multiplied by the trend tracking factor. The previous "trend" is multiplied by one minus the trend tracking factor. The two are added together to estimate the new smoothed "trend." An initial "trend" is estimated by subtracting an average of the first two exponential averages from an average of the first three exponential averages.

The final exponential plus trend is the exponential average that you can. It may still have a bias that makes it less accurate than a no change estimate. Then, after you have tuned the exponential average, you can adjust the exponential trend rect the bias error.

The forecast is the final exponential plus trend estimate plus the trend estimate. It is the most recent smoothed estimate plus the latest smoothed change.

To help you evaluate the estimates and the forecast, the program computes the mean and standard deviation of the original data and the standard error of the

```
----------STANDARD ERRORS----------
NO CHANGE        TREND            EXPONENTIAL      EXPONENTIAL
                 CYCLE            AVERAGE          PLUS TREND
 30.103           19.293           28.696           19.529


---PERCENT IMPROVEMENT OVER NO CHANGE---
TREND            EXPONENTIAL      EXPONENTIAL
CYCLE            AVERAGE          PLUS TREND
 56.031           4.905            54.146
ORIGINAL SERIES AND TREND-CYCLE

ORIGINAL SERIES AND TREND-CYCLE
I
I
I                    **
I                   *O
I                  *
I                 *    OO
I          *     *
I-------*OOO*--------
I      **   **
I     *
I   *                     *
I**
I
I


ORIGINAL SERIES AND EXPONENTIAL AVERAGE
I
I
I                     **
I                    *
I                  *   O
I                 *   O
I          *     * OO   O
I-------*---*-O------
I      ** O**OO
I     *   O
I   *OOO                  *
I**O
I
I


ORIGINAL SERIES AND EXPONENTIAL PLUS TREND
I
I
I                     **
I                    *O
I                   *O    OOO
I                  *O    O
I          *     *O
I-------*OOO*--------
I      **   **
I   O*O
I  *                      *
I**
I
I                        ---
```

WE WILL NOT BE UNDERSOLD

DISK DRIVES

FOR TRS-80* Model I		
CCI-100 TEAC	5¼", 40 Track (102K)	$314
CCI-100 MPI	5¼", 40 Track (102K)	$319
CCI-280	5¼", 80 Track (204K)	$429
ADD-ON DRIVES FOR ZENITH Z-89		
CCI-189	5¼", 40 Track (102K)	$394
CCI-289	5¼", 80 Track (204K)	$499
Z-87	Dual 5¼" system	$995

External card edge and power supply included. 90 day warranty/one year on power supply.

RAW DRIVES 8" SHUGART 801R $425
5¼" MPI, TEAC or TANDOM **$ CALL** POWER SUPPLIES **$ CALL**

MORROW DESIGNS/THINKER TOYS™

DISCUS 2D	1 DRIVE	**$ 938**	2 DRIVE	$1635
DISCUS 2 + 2	1 DRIVE	**$1259**	2 DRIVE	$2245
DISCUS Hard Disk	M26	**$3990**	M10	$2999

DEI CARTRIDGE TAPE BACK-UP

For your hard disk. With either S-100 control card or piggy back board for single board Z-80 computers. $2995

DISKETTES — Box of 10 with plastic library case

5¼"	**Scotch**	**$35**	**Maxell**	**$40**	**BASF/Verbatim** $27.95
8"	**Scotch**	**$50**	**Maxell**	**$55**	**BASF/Verbatim** $36.00

PLASTIC CASE–Holds 50 5¼" diskettes $19.00
SCOTCH HEAD CLEANING DISKETTE $25.00
FLOPPY SAVER $11.95 RINGS $6.95

COMPLETE SYSTEMS

ARCHIVES	64K, 2-Drives, 77 Track			$5495
ALTOS	ACS8000 Series			$ CALL
TRS-80*	II-64K	**$3499**	III-16K	$ 899
TRS-80*	Expansion Interface			$ 299
ZENITH	48K, all-in-one computer			$2200
ZENITH	Z-19			$ 735
TELEVIDEO	920C	**$ 748**	950	$1049
IBM	3101 Display Terminal			$1189
ATARI	400	**$ 479**	800	$ 795
MATTEL	INTELLIVISION			$ 229
APPLE PERIPHERALS				$ CALL

MONITORS

APF	9" B & W TVM-10		$120
BELL & HOWELL	9" B & W BHD911		$220
LEEDEX	12" B & W **$129**	13" Color	$369
SANYO	9" B & W VM4509		$155
SANYO	12" B & W DM5012		$226
SANYO	12" Green Screen DM5112		$238
SANYO	13" Color DMC6013		$416
ZENITH	13" Color		$349

TELECOMMUNICATIONS

LIVERMORE STAR MODEM 2-year guarantee	$125
UNIVERSAL DATA SYSTEMS UDS-103	$179
D-CAT HARD WIRED DIRECT MODEM	$189
AUTO-CAT Auto Answer, Direct Connect Modem	$229
D.C. HAYES MICRO-MODEM	$329

PRINTERS

NEC Spinwriter
Letter Quality High Speed Printer
R.O. $2395
R.O. with tractor feed $2595
KSR with tractor feed $2895

C.ITOH	Starwriter	**$1695**	Starwriter II	$1895
EPSON	MX-80	**$479**	MX-70	$ 399
PAPER TIGER				
IDS 445	Graphics & 2K buffer			$ 699
IDS 460	Graphics & 2k buffer			$1050
IDS 560	Graphics			$1450
ANADEX	DP-8000	**$849**	DP-9500/01	$1345
OKIDATA				
Microline 80	Friction & pin feed			$ 420
Microline 80	Friction, and pin & tractor feed			$ 520
Microline 82	Friction & pin feed feed			$ 620
Microline 83	120 cps, uses up to 15" paper			$ 849
CENTRONICS	730 **$ 595**	737 **$ 749**	779	$ 969
TI-810				

TRS-80* software, compressed print & vert. form control $1865

16K RAM KITS

2 for $56 **$30**
200 ns for TRS-80*, Apple II, (specify): **Jumpers** $2.50

S-100 CALIFORNIA COMPUTER SYSTEMS

MAINFRAME	Model 2200A	$349
Z80 CPU	Model 2810	$269
MOTHER BOARD	Model 2501	$106
16K STATIC RAM, 200ns	Model 2116C	$309
32K STATIC RAM, 200ns	Model 2032C	$619
64K DYNAMIC RAM	Model 2065C	$599
FLOPPY DISC CONTROLLER	Model 2422A	$359
EXTENDER BOARD	Model 2520K	$ 52
2P + 2S I/O	Model 2718A	$309

APPLE ACCESSORIES AND SOFTWARE

VISICALC	$120.00
DB MASTER	$159.00
Z-80 SOFTCARD	$269.00
VIDEX BOARD	$259.00
16K CARD	$169.00
APPLE JOYSTICK	$ 49.00
SUPERMOD	$ 29.00
CCS CARDS	$ CALL
GALAXIAN	$ 22.95
SPACE ALBUM	$ 35.00
ASTEROIDS	$ 17.95
FLIGHT SIMULATOR	$ 29.00
WIZARD & PRINCESS	$ 28.00
SARGON 2	$ 29.00
HI-RES FOOTBALL	$ 35.00
MYSTERY HOUSE	$ 21.00

For fast delivery, send certified checks, money orders or call to arrange direct bank wire transfers. Personal or company checks require two to three weeks to clear. All prices are **mail order only** and are subject to change without notice. **Call for shipping charges.**

DEALER (NATIONAL/INTERNATIONAL) INQUIRIES INVITED **Send for FREE Catalogue**

The CPU SHOP

TO ORDER CALL TOLL FREE 1-800-343-6522
TWX: 710-348-1796 Massachusetts Residents call 617/242-3361

5 Dexter Row, Dept. K05M
Charlestown, Massachusetts 02129
Hours 10AM-6PM (EST) Mon.-Fri. (Sat. till 5)

Technical Information call 617/242-3361
Massachusetts Residents add 5% Sales Tax
Tandy Corporation Trademark® Digital Research

master charge THE INTERBANK CARD
VISA

CIRCLE 171 ON READER SERVICE CARD

estimates. The standard error of the estimates is the root mean square of the difference between the estimate and the original data.

Trend3 also produces the standard error of a "no change" estimate. The "no change" estimate is the estimate you would have if you simply used the current data as the forecast without change. The objective of making forecasts is to come closer to what will happen than if you simply assumed no change. Thus, the standard error of the no change estimate is a standard against which to measure the improvement made by the forecast.

The program prints the percentage improvement that the smoothed estimates are over assuming no change. Since sometimes no change is the best estimate, the percentage improvement may be negative.

Trend3 also plots the comparison between the original data "*" and the smoothed estimates "O" in three separate graphs. Where the original estimate and the smoothed estimate coincide on the plot, only the original estimate "*" is printed. The scale of these graphs is set by the number of Lines L1, and the number of standard deviations L2. These can be adjusted.

Either of two methods may be used to better fit the forecast model to your data. One is to use the same number as both the exponential smoothing factor and the trend tracking factor. Adjust them both at once until the final exponential plus trend best fits your original data. The best fit is the one that is the biggest improvement over no change. Then you might experiment with changing either one of the two exponential factors separately.

The other method is to adjust the exponential smoothing factor to get the best exponential average thet you can. It may still (ave a bias that makes it less accurate than a no change estimate. Then, after you have tubned the exponential average, you can adjust the exponentian trend tracking factor to obtain the best final exponential plus trend.

It is a good idea to keep a record of your forecasts compared to actual events. You can use the results to evaluate your forecasts and the probability of their accuracy. You can also use them to adjust your forecasting strategy. You may find it interesting to make your own judgemental forecasts first to see if you can beat the computer model.

Program Notes

This program was debugged and tested on a small Wang office computer.

The program assumes monthly data will be used. It asks you to input the number for the first month for which you will enter data. If the first month is January, enter 1. If it is February enter 2, and so on. The

	Original Series Y	3-Month Moving Average A	3-Month Moving Average	Trend-Cycle C
MAR	110			
APR	120	120		
MAY	130	130	130	130
JUN	140	140	140	140
JUL	150	150		150
AUG	160			155

where 155 = 150 + .5*(150-140)

EXPONENTIAL AVERAGE

	Original Series Y	S1*Y	(1-S1)*E(I-1)	Exponential Average E
MAR	110			
APR	120			
MAY	130			120
JUN	140	28	96	124
JUL	150	30	99.2	129.2
AUG	160	32	103.36	135.36

where S1 = .2 so 1-S1 = .8
and 120 = (110 + 120 + 130)/3

TREND

	Exponential Average F	Change in Average	S2 times Change	1-S2 times Trend	Trend T
MAR					
APR					
MAY	120				5
JUN	124	4	.8	4	4.8
JUL	129.2	5.2	1.04	3.84	4.88
AUG	135.36	6.16	1.232	3.904	5.136

where S2 = .2 so 1-S2 = .8
and 5 = (110+120+130)/3 - (110+120)/2 = 120 - 115

EXPONENTIAL AVERAGE ADJUSTED FOR TREND

	Exponential Average E	Trend T	4*Trend	Exponential Plus Trend F
MAR				
APR				
MAY	120	5	20	140
JUN	124	4.8	19.2	143.2
JUL	129.2	4.88	19.52	148.72
AUG	135.36	5.13	20.544	155.904

where 4 is the result of (1-S2) S2 or .8 .2

THE ORIGINAL MAGAZINE FOR OWNERS OF THE TRS-80™* MICROCOMPUTER

SOFTWARE FOR TRS-80™ OWNERS

THE COMPUTRONICS INC.

MONTHLY NEWSMAGAZINE FOR TRS-80™ OWNERS

MONTHLY NEWSMAGAZINE

Practical Support For Model I, II & III

- PRACTICAL APPLICATIONS
- BUSINESS
- GAMBLING • GAMES
- EDUCATION
- PERSONAL FINANCE
- BEGINNER'S CORNER
- NEW PRODUCTS
- SOFTWARE EXCHANGE
- MARKET PLACE
- QUESTIONS AND ANSWERS
- PROGRAM PRINTOUTS

. . . . AND MORE

PROGRAMS AND ARTICLES PUBLISHED IN OUR FIRST 12 ISSUES INCLUDE THE FOLLOWING

- A COMPLETE INCOME TAX PROGRAM (LONG AND SHORT FORM)
- INVENTORY CONTROL
- STOCK MARKET ANALYSIS
- WORD PROCESSING PROGRAM (FOR DISK OR CASSETTE)
- LOWER CASE MODIFICATION FOR YOUR VIDEO MONITOR OR PRINTER
- PAYROLL (FEDERAL TAX WITHHOLDING PROGRAM)
- EXTEND 16 DIGIT ACCURACY TO TRS 80™ FUNCTIONS (SUCH AS SQUARE ROOTS AND TRIGONOMETRIC FUNCTIONS)
- NEW DISK DRIVES FOR YOUR TRS 80™
- PRINTER OPTIONS AVAILABLE FOR YOUR TRS 80™
- A HORSE SELECTION SYSTEM***ARITHMETIC TEACHER
- COMPLETE MAILING LIST PROGRAMS (BOTH FOR DISK OR CASSETTE SEQUENTIAL AND RANDOM ACCESS)
- RANDOM SAMPLING***BAR GRAPH
- CHECKBOOK MAINTENANCE PROGRAM
- LEVEL II UPDATES***LEVEL II INDEX
- CREDIT CARD INFORMATION STORAGE LIST
- BEGINNERS GUIDE TO MACHINE LANGUAGE AND ASSEMBLY LANGUAGE
- LINE RENUMBERING
- AND CASSETTE TIPS, PROGRAM HINTS, LATEST PRODUCTS COMING SOON, GENERAL LEDGER ACCOUNTS PAYABLE AND RECEIVABLE, FORTRAN 80, FINANCIAL APPLICATIONS PACKAGE, PROGRAMS FOR HOMEOWNERS, MERGE TWO PROGRAMS, STATISTICAL AND MATHEMATICAL PROGRAMS (BOTH ELEMENTARY AND ADVANCED) . . . AND

* TRS-80™ is a registered trademark of Tandy Corp.

FREE*

6

WORD PROCESSING PROGRAM For writing letters, text, mailing lists, etc., with each new subscriptions or renewal

LEVEL II RAM TEST Checks random access memory to ensure that all memory locations are working properly

DATA MANAGEMENT SYSTEM Complete file management for your TRS 80™

CLEANUP Fast action Maze Game

ADVENTURE Adventure #0 by Scott Adams (From Adventureland International)

FREE

*** All programs are supplied on cassette (add $3 for Diskette Version - add $5 for modified Mod-II Version).**

SEND FOR OUR NEW 48 PAGE SOFTWARE CATALOG (INCLUDING LISTINGS OF HUNDREDS OF TRS 80™ PROGRAMS AVAILABLE ON CASSETTE AND DISKETTE) $2.00 OR **FREE** WITH EACH SUBSCRIPTIONS OR SAMPLE ISSUE

COMPUTRONICS

50 N. PASCACK ROAD
SPRING VALLEY, NEW YORK 10977

ONE YEAR SUBSCRIPTION $24

TWO YEAR SUBSCRIPTION $48

SAMPLE OF LATEST ISSUE $ 4

START MY SUBSCRIPTION WITH ISSUE . . .

(#1 - July 1978 • #7 - January 1979 • #12 - June 1979 • #18 - January 1980)

NEW SUBSCRIPTION RENEWAL . . .

CREDIT CARD NUMBER _____ EXP. DATE _____

SIGNATURE _____

NAME _____

ADDRESS _____ CITY _____ STATE _____ ZIP _____

*** ADD $6 YEAR (CANADA, MEXICO) - ADD $12 YEAR AIR MAIL - OUTSIDE OF U.S.A., CANADA & MEXICO ***

24 HOUR ORDER LINE
(914) 425-1535

NEW TOLL-FREE ORDER LINE
(OUTSIDE OF N.Y. STATE)
(800) 431-2818

CIRCLE 138 ON READER SERVICE CARD

number must be between 1 and 12. You can enter the last digit of the year to keep track of the output if you are using yearly data.

The constant D2 determines the number of decimal places to be printed as suggested by Jordan Mechner in *Creative Computing*, September 1979.

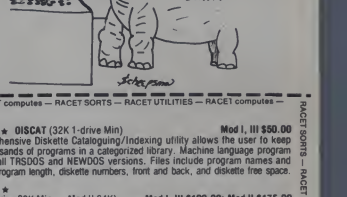
The exponential smoothing methods used in the program are further described in:

Mathematics for Management, Vol. 2. Advanced Methods and Models by Springer, Herlihy, Beggs; Dow Jones-Irwin, 1965.

Short-Term Forecasting by Robert L. McLaughlin and James J. Boyle, American Marketing Association, 1965.

```
1000 PRINT "----------------------------------------"
1010 PRINT "I                                      I"
1020 PRINT "I              TREND3                  I"
1030 PRINT "I  A program for short-range           I"
1040 PRINT "I  forecasts using exponential         I"
1050 PRINT "I  smoothing, by H. Jackson            I"
1060 PRINT "I  from CREATIVE COMPUTING             I"
1070 PRINT "----------------------------------------"
1080 REM
1090  DIM M$(12)3,M(21),Y(18),A(18),C(18),E(18),
     T(18),F(21)
1100 REM
1110 REM N,)   MONTH NUMBER, JAN EQ 1
1120 REM Y()   ORIGINAL SERIES OF DATA
1130 REM A()   3-MONTH MOVING AVERAGE
1140 REM C()   TREND-CYCLE, 3 X 3 MOVING AVERAGE
1150 REM E()   EXPONENTIALLY SMOOTHED AVERAGE
1160 REM T()   TREND, EXPONENTIALLY SMOOTHED CHANGE
1170 REM F()   FINAL EXPONENTIAL AVERAGE PLUS TREND
1180 REM
1190  DATA "JAN","FEB","MAR","APR","MAY","JUN"
1200  DATA "JUL","AUG","SEP","OCT","NOV","DEC"
1210 REM *** VARIABLES ***
1220 REM S1  EXPONENTIAL SMOOTHING FACTOR
1230 REM S2  EXPONENTIAL TREND TRACKING FACTOR
1240 REM M1  MEAN
1250 REM M2  STANDARD DEVIATION
1260 REM M3  STANDARD ERROR OF NO CHANGE
1270 REM M4  STANDARD ERROR OF TREND-CYCLE
1280 REM M5  STANDARD ERROR OF EXPONENTIAL AVERAGE
1290 REM M6  STANDARD ERROR OF EXPONENTIAL PLUS TREND
1300 REM Q1$ DUMMY VARIABLE
1305 REM
1310 REM *** CONSTANTS ***
1320  LET P = 18: REM PERIODS OF DATA
1330  LET L1 = 1.6
1340  LET L2 = 2.5
1350  LET D2 = 3 : REM DECIMAL PLACES TO BE PRINTED
1355 REM
1360 REM *** INPUT ROUTINE ***
1370  PRINT "YOU WILL ENTER "; P; " PERIODS OF DATA."
1380  INPUT "THE NUMBER OF THE FIRST MONTH", N(1)
1381  IF N(1) > 0 THEN 1380
1382  IF N(1) ] 12 THEN 1380
1390  FOR I = 1 TO P
1400    INPUT "ENTER DATA", Y(I)
1410    N(I) = N(1) + (I-1)
1420  NEXT I
1430  INPUT "EXPONENTIAL SMOOTHING FACTOR", S1
1440  INPUT "EXPONENTIAL TREND TRACKING FACTOR", S2
1450 REM
1460 REM *** TREND-CYCLE ***
1470  LET A(1) = 0
1480  LET A(P) = 0
1490  FOR I = 2 TO P-1
1500    A(I) = (Y(I-1) + Y(I) + Y(I+1))/3
1510  NEXT I
1520  LET C(1) = 0
1530  LET C(2) = 0
1540  FOR I = 3 TO P-2
1550    C(I) = (A(I-1) + A(I) + A(I+1))/3
1560  NEXT I
1570  C(P-1) = A(P-1)
1580  C(P) = C(P-1) + (C(P-1) - C(P-2))/2
1590 REM
1600 REM *** EXPONENTIAL AVERAGE ***
1610  E(1) = 0
1620  E(2) = 0
1630  E(3) = (Y(1) + Y(2) + Y(3))/3
1640  FOR I = 4 TO P
1650    E(I) = S1 * Y(I) + (1-S1) * E(I-1)
1660  NEXT I
1670 REM
1680 REM *** EXPONENTIALLY SMOOTHED TRENO ***
1690  T(1) = 0
1700  T(2) = 0
1710  T(3) = ((Y(1) + Y(2) + Y(3))/3) - (Y(1) + Y(2))/2
1720  FOR I = 4 TO P
1730    T(I) = S2 * (E(I) - E(I-1)) + (1-S2) * T(I-1)
1740  NEXT I
1750 REM
1760 REM *** FINAL EXPONENTIAL PLUS TREND ***
1770  F(1) = 0
1780  F(2) = 0
1790  FOR I = 3 TO P
1800    F(I) = T(I) * ((1-S2)/S2) + E(I)
1810  NEXT I
1820 REM
1830 REM *** FORECAST ***
1840  FOR I = P+1 TO P+3
1850    F(I) = F(I-1) + T(P)
1860  NEXT I
1865 REM
1870 REM *** MEAN AND STANDARD DEVIATION ***
1880  M1 = 0
1890  M2 = 0
1900  FOR I = 1 TO P
1910    M1 = Y(I) + M1
1920    M2 = Y(I)12 + M2
1930  NEXT I
1940  M1 = M1/P
1950  M2 = SQR(M2/P - M1)2)
1960 REM
1970 REM *** STANDARD ERRORS ***
1980  M3 = 0
1990  M4 = 0
2000  M5 = 0
2010  M6 = 0
2020  FOR I = 3 TO P
2030    M3 = (Y(I) - Y(I-1))12 + M3
2040    M4 = (C(I) - Y(I))12 + M4
2050    M5 = (E(I) - Y(I))12 + M5
2060    M6 = (F(I) - Y(I))12 + M6
2070  NEXT I
2080  M3 = SQR(M3/(P-2))
2090  M4 = SQR(M4/(P-2))
2100  M5 = SQR(M5/(P-2))
2110  M6 = SQR(M6/(P-2))
2120 REM
2130 REM *** PRINT ROUTINE ***
2131  FOR I = 1 TO 12
2132    READ M$(I)
2133  NEXT I
2140  PRINT "MO","ORIGINAL","TRENO","EXPONENTIAL"
2150  PRINT , "SERIES","CYCLE","AVERAGE"
2160  FOR I = 1 TO P
2170    R = N(I)
2180    IF R [= 12 THEN 2200
2190      R = R - 12
2195      IF R ] 12 THEN 2190
2200    PRINT N(I);M$(R),INT((10!02)*Y(I))/(10!02),
2202    PRINT INT((10!02)*C(I))/(10!02),
2207    PRINT INT((10!02)*E(I))/(10!02)
2210  NEXT I
2220  INPUT "ENTER Y TO CONTINUE", Q1$
2230 REM *** SECONO PAGE ***
2240  PRINT "MO","TRENO","EXPONENTIAL"
2250  PRINT , , "PLUS TRENO"
2260  FOR I = 1 TO P
2270    R = N(I)
2280    IF R [= 12 THEN 2300
2290      R = R - 12
2295      IF R ] 12 THEN 2290
2300    PRINT N(I);M$(R),INT((10!02)*T(I))/(10!02),
2305    PRINT INT((10!02)*F(I))/(10!02)
2310  NEXT I
2320  PRINT , , "FORECAST"
2330  FOR I = P+1 TO P+3
2340    N(I) = N(1) + (I-1)
2350    R = N(I)
2360    IF R [= 12 THEN 2380
2370      R = R - 12
2375      IF R ] 12 THEN 2370
2380    PRINT N(I);M$(R),,INT((10!02)*F(I))/(10!02)
2390  NEXT I
2400  INPUT "ENTER Y TO CONTINUE", Q1$
```

```
2410 REM *** THIRD PAGE ***
2420  PRINT "MEAN "; INT((10!02)*H1)/(10!02);
2430  PRINT "STANDARD ERROR "; INT((10!02)*H2)/(10!02)
2435  PRINT
2440  PRINT "------------STANDARD ERRORS-------------"
2450  PRINT "NO CHANGE","TRENO","EXPONENTIAL","EXPONENTIAL"
2460  PRINT , "CYCLE","AVERAGE","PLUS TRENO"
2470  PRINT INT((10!02)*H3)/(10!02),INT((10!02)*H4)/(10!02),
2471  PRINT INT((10!02)*H5)/(10!02),INT((10!02)*H6)/(10!02)
2480  PRINT
2490  PRINT "---PERCENT IMPROVEMENT OVER NO CHANGE---"
2500  PRINT "TRENO","EXPONENTIAL","EXPONENTIAL"
2510  PRINT "CYCLE","AVERAGE","PLUS TRENO"
2520  H4 = (H3/H4)*100 - 100
2521  H5 = (H3/H5)*100 - 100
2522  H6 = (H3/H6)*100 - 100
2523  PRINT INT((10!02)*H4)/(10!02),INT((10!02)*H5)/(10!02),
2524  PRINT INT((10!02)*H6)/(10!02)
2530 REM
2540 REM *** GRAPH ROUTINE ***
2550 FOR W = 1 TO 3: REM SELECT PLOT
2560   ON W GOTO 2620, 2600
2580     PRINT "ORIGINAL SERIES AND EXPONENTIAL PLUS TRENO"
2590     GOTO 2630
2600   PRINT "ORIGINAL SERIES AND EXPONENTIAL AVERAGE"
2610   GOTO 2630
2620   PRINT "ORIGINAL SERIES AND TRENO-CYCLE"
2630   FOR I = L1 TO 1 STEP -1
2640     PRINT "I";
2650     FOR J = 1 TO P
2660   IF I[]INT(((Y(J)-H1)/(L2*H2))*(L1/2)+L1/2+.5) THEN 2690
2670       PRINT "*";
2680       GOTO 2885
2690     IF J ]= 3 THEN 2735
2700       IF I [] INT(L1/2 + .5) THEN 2720
2710         PRINT "-";
2715       GOTO 2885
2720       PRINT " ";
2730       GOTO 2885
2735     ON W GOTO 2740,2790,2820
2740   IF I[]INT(((C(J)-H1)/(L2*H2))*(L1/2)+L1/2+.5) THEN 2950
2760       PRINT "O";
2770       GOTO 2885
2790   IF I[]INT(((E(J)-H1)/(L2*H2))*(L1/2)+L1/2+.5) THEN 2850
2800       PRINT "O";
2810       GOTO 2885
2820   IF I[]INT(((F(J)-H1)/(L2*H2))*(L1/2)+L1/2+.5)
       THEN 2950
2830         PRINT "O";
2840       GOTO 2885
2850     IF I[] INT(L1/2+.5) THEN 2880
2860       PRINT "-";
2870       GOTO 2885
2880     PRINT " ";
2885   NEXT J
2890     ON W GOTO 2970,2970
2900       FOR J = P+1 TO P*3
2910   IF I[]INT(((F(J)-H1)/(L2*H2))*(L1/2)+L1/2+.5)
       THEN 2930
2920         PRINT "O";
2925       GOTO 2960
2930     IF I [] INT(L2/2+.5) THEN 2950
2940       PRINT "-";
2945       GOTO 2960
2950     PRINT " ";
2960   NEXT J
2970   PRINT
2980 NEXT I
2990 ON W GOTO 3000,3000,3020
3000   INPUT "ENTER Y TO CONTINUE", D1$
3010 NEXT W
3020 END
```



RACET SORTS — RACET UTILITIES — RACET computes — RACET SORTS — RACET UTILITIES — RACET computes — RACET SORTS — RACET UTILITIES — RACET computes —

HARD DISK MULTIPLEXOR WITH 10 MEG HARD DISK FOR THE TRS-80* Mod II

NOW YOU CAN HAVE THAT LARGE COMMON DATA BASE!!

- Allows up to 4 Mod II's to connect to a single controller — up to 4 hard disk drives per controller. Users may access the same file simultaneously (first-come first-served).
- Uses Cameo controller and standard 10-megabyte cartridge (hard) disk drives along with RACET Hard/Soft Disk System (HSD) software.
- Access times 3 to 8 times faster than floppy. Mixed floppy/hard disk operation supported.
- Compatible with your existing TRSDOS programs! All BASIC statements are identical.
- A single file may be as large as one disk. Alternate mode allows 24-million byte record range. Directory expandable to handle thousands of files.
- Includes special utilities — backup and copies, HPURGE for multiple deletions, HDCS directory catalog system, and Hard Disk Superzap. FORMAT utility includes options for specifying sectors/gran, platters/drive, logical disk size, etc.

HARD DISK DRIVE & CONTROLLER $5995 RACET HSD Software $400
Call for multiuser pricing. Dealers call for OEM pricing.

INFINITE BASIC (Mod I & III Tape or Disk) **Mod I $50.00, Mod III $60.00**
Extends Level II BASIC with complete MATRIX functions and 50 more string functions. Includes RACET machine language sorts! Sort 1000 elements in 9 seconds!! Select only functions you want to optimize memory usage.

INFINITE BUSINESS (Requires Infinite BASIC) **Mod I & III $30.00**
Complete printer pagination controls — auto headers, footers, page numbers. Packed decimal arithmetic — 127 digit accuracy +, −, *, /. Binary search of sorted and unsorted arrays. Hash codes.

BASIC CROSS REFERENCE UTILITY (Mod II 64K) **$50.00**
SEEK and FIND functions for Variables, Strings, Keywords. 'All' options available for line numbers and variables. Load from BASIC — Call with 'CTRL'R. Output to screen or printer!

OSM Mod I $75.00, Mod II $150.00, Mod III $90.00
Disk Sort/Merge for RANDOM files. All machine language stand-alone package for sorting speed. Establish sort specification in simple BASIC command File. Execute from DOS. Only operator action to sort is to change diskettes when requested! Handles multiple diskette files! Super fast sort times — improved disk I/O times make this the fastest Disk Sort/Merge available on your TRS.
(Mod I Min 32K 2-drive system, Mod II 64K 1-drive, Mod III 32K 1-drive)

★★NEW★★ OISCAT (32K 1-drive Min) **Mod I, III $50.00**
This comprehensive Diskette Cataloguing/Indexing utility allows the user to keep track of thousands of programs in a categorized library. Machine language program works with all TRSDOS and NEWDOS versions. Files include program names and extensions, program length, diskette numbers, front and back, and diskette free space.

★★NEW★★
KFS-80 (1-drive 32K Min — Mod II 64K) **Mod I, III $100.00; Mod II $175.00**
The keyed file system provides keyed and sequential access to multiple files. Provides The programmer with a powerful disk handling facility for development of data base applications. Binary free index system provides rapid access to file records.

★★NEW★★
MAILLIST (1-drive 32K Min - Mod II 64K) **Mod I, III $75.00; Mod II $150.00**
This ISAM-based maillist minimizes disk access times. Four keys — no separate sorting. Supports 9-digit zip code and 3-digit state code. Up to 30 attributes. Mask and query selection. Record access times under 4 seconds!!

★★NEW★★ LPSPOOL (32K 1-drive Min) **Mod I $75.00**
LPSPOOL — Add multi-tasking to permit concurrent printing while running your application program. The spooler and despooler obtain print jobs from queues maintained by the system as print files are generated. LPSPOOL supports both parallel and serial printers.

UTILITY PACKAGE (Mod II 64K) **$150.00**
Important enhancements to the Mod II. The file recovery capabilities alone will pay for the package in even one application! Fully documented in 124 page manual! XHIT, XGAT, XCOPY and SUPERZAP are used to reconstruct or recover date from bad diskettes! XCOPY provides multi-file copies. 'Wild-card' mask select, absolute sector mode and other features. SUPERZAP allows examine/change any sector on diskette include track-0, and absolute disk backup/copy with I/O recovery. DCS builds consolidated directories from multiple diskettes into a single display or listing sorted by disk name or file name plus more. Change Disk ID with DISKID. XCREATE preallocates files and sets 'LOF' to end to speed disk accesses. DEBUGII adds single step, trace, subroutine calling, program looping, dynamic disassembly and more!!

EQUIPMENT PACKAGE (Mod II 64K) **$125.00**
Includes RACET machine language SUPERZAP, Apparat Disassembler, and Model II interface to the Microsoft 'Editor Assembler Plus' software package including uploading services and patches for Disk I/O.

CHECK, VISA, M/C, C.O.D., PURCHASE ORDER
TELEPHONE ORDERS ACCEPTED (714) 637-5015
*TRS-80 IS A REGISTERED TRADEMARK OF TANDY CORPORATION

RACET COMPUTES
1330 N. Glassel, Suite 'M'
Orange, CA 92665

RACET SORTS — RACET UTILITIES — RACET computes — RACET SORTS — RACET UTILITIES — RACET computes — RACET SORTS — RACET UTILITIES — RACET computes —

CIRCLE 188 ON READER SERVICE CARD

INVESTING IN MUTUAL FUNDS

John S. Browning
Nicholas J. Clemens

To make money in the stock market one would like to buy low and sell high. That is sound advice, but with today's market gyrations it is not always clear when to buy or sell. However, using the following automated system one could, with a little effort, achieve a 15% annualized compounded growth rate on money invested. That's certainly a lot better than the usual formula of buy high and sell low and take the loss as a tax write-off! For example an investment of $100 per month invested at an annual yield of 25% with the earnings reinvested and compounded annually would yield over $514,400 in a 20-year period and over $4,840,000 in a 30-year period. Compare this with the $100,500 one would expect from a regular saving account at approximately 5.75%. This method can truly make your personal computer pay for itself.

Methodology

There are no simply stated, foolproof rules for making money in the stock market. The only sure thing about stock prices is that they will fluctuate. The system presented here is based on speculation over several months. The investment vehicles are mutual funds and money market funds. The system does not atempt to determine when the price of a share in a mutual fund is low or high. On the contrary, the system attempts to determine if the price will continue to rise. When a drop seems imminent, the investor exchanges shares he has in a mutual fund for shares in a money market fund. Strong nerves are required to sell short, because on the whole the market is over-optimistic and potential loss is great. The system is designed to help the investor avoid the losses of a bear market.

Part of the system is based on an investment method developed by Richard J. Fabian, a registered financial advisor in the State of California. His approach is not novel. He simply tracks moving averages of mutual funds selected for performance and using the Telephone Switch Option offered by these funds, moves his holdings from the securities market (stocks), to a money market vehicle or bank account depending on the fund, or vice versa. This method works best when using groups of mutual funds with self contained money market funds.

The telephone switch option allows an investor simply to pick up the phone when a switch signal occurs and instruct the fund managers to transfer his holdings.

The great advantage of Fabian's plan is simplicity. If automated the entire system can be accomplished by almost anyone in less than one hour a week. However, the uninformed investor is his own worst enemy. No matter how much is invested, one should watch his money very carefully, glancing at the Dow Jones Industrial and Transportation Averages along with the selected funds and stocks in which he has holdings every day.

The basic assumption underlying the system is that all mutual funds will move in the same direction as the general market. If the stock market is up (i.e., the Dow Jones Industrial and Transportation Averages are up) then the net asset value or worth of a share of a mutual fund will also be up. By the same reasoning if a bear market should hit and stock prices decline, so will the mutual funds.

By investing in mutual funds one complex variable in choosing a good investment vehicle has been eliminated. That is which stock to choose. Instead of picking the correct stock out of the thousands without the benefit of a vast research staff and inside management contacts, one only has to determine if the market as a whole will be going up or down.

To determine market movement a personal computer system is used to track the Dow Jones Industrial and Transportation Averages, the net asset values of selected funds, and to calculate a moving average for all of the above. Fabian claims he has undertaken extensive computer studies to determine that 39 weeks is an optimum window width for the average, however other financial advisors use different window widths.

In addition, dividend values are kept to correct the average and net asset values. Exchange signals are generated, and based on these signals money is moved between the mutual funds and money market funds. When the stock market is going down, accumulated capital is preserved in an interest-bearing account or money market fund while monthly investments are used to purchase shares of a mutual fund as the price per share is low. When the stock market is going up, accumulated capital is switched from the money market fund into the mutual fund to take advantage of

John S. Browning, 2071 B Mercury SE, Kirtland AFB, NM 87118.

SOFTWARE UNLIMITED

presenting the LARGEST SELECTION OF SOFTWARE EVER ASSEMBLED...

for ATARI® • APPLE® • PET® • TRS-80® and other Microcomputers

at SUPER DISCOUNT PRICES!

ADVENTURE INTERNATIONAL

- ☐ ADVENTURE #0 (T) 8.25
- ☐ ADVENTURE #1 (D) (AP) (T) 35.95
- ☐ ADVENTURE #2 & 3 (D) (AP) (T) 35.95
- ☐ ADVENTURE (specify 1-10) (AP) (T) 13.55
- ☐ PROJECT OMEGA (T) 13.55
- ☐ PROJECT OMEGA (T) (D) 22.50
- ☐ PLANET OMEGA (D) (AP) 17.95
- ☐ MEAN CHECKERS MACHINE (T) 17.95
- ☐ DR. CHESS (T) 13.55
- ☐ KID-VENTURE 1 (AP) (T) 13.55
- ☐ LUNAR LANDER COLOR ONLY (C) 13.55
- ☐ MOUNTAIN SHOOT (AT) 8.95
- ☐ SLAG (T) 13.55
- ☐ STAR TREK 3.5 (AT) (T) 13.55
- ☐ STAR TREK 3.5 (D) (T) 17.95
- ☐ SUNDAY GOLF (AT) 8.95
- ☐ ZOSSED IN SPACE (T) 13.55

AVALON HILL

- ☐ MIDWAY (P-T AP) 13.50
- ☐ NUKE WAR (P-T AP) 13.50
- ☐ PLANET MINERS (P-T AP) 13.50
- ☐ CONVERT RAIDER (P-T AP) 13.50
- ☐ B1 BOMBER (P-T AP) 13.50
- ☐ LORDS OF KARNAA (P-T AP) 18.00

ACORN SOFTWARE

- ☐ ATERM (T) 17.95
- ☐ SYSTEM VIEWER (T) 13.55
- ☐ TING-TONG (T) 8.95
- ☐ DISASSEMBLER (T) 13.55
- ☐ DISK UTILITY (T) 17.95
- ☐ CHECKBOOK (D) (T) 22.95
- ☐ STAR TREK SIMULATION (T) 8.95
- ☐ OPERA THEATRES (T) 8.95
- ☐ GAMMON CHALLENGER (T) 13.55
- ☐ PIGSKIN (T) 13.55
- ☐ STRUCTURED BASIC (D) (T) 26.95
- ☐ ULTRA TREK (T) 13.55
- ☐ SPACE WAR (T) 8.95
- ☐ WARP LANDER (T) 8.95
- ☐ BASKETBALL (D) (T) 18.95
- ☐ BASKETBALL (T) 13.55
- ☐ DUEL-N-DROIDS (D) (T) 18.95
- ☐ DUEL-N DROIDS (T) 13.55
- ☐ INVADERS FROM SPACE (T) 13.55
- ☐ INVADERS FROM SPACE (D) (T) 18.95
- ☐ PIGSKIN (D) (T) 18.95
- ☐ PINBALL (T) 13.55
- ☐ PINBALL (D) (T) 18.95
- ☐ QUAD (T) 13.55
- ☐ QUAD (D) (T) 18.95
- ☐ SUPERSORT (D) (T) 26.95

AUTOMATED SIMULATION

- ☐ TUESDAY QUARTERBACK (D) (AP) 26.95
- ☐ STAR WARRIOR (C) (D) (AP) (T) 35.95
- ☐ THREE PACK (D) (AP-P-T) 45.00
- ☐ STARFLEET ORION (C) (D) (AP) 24.95
- ☐ STARFLEET ORION (C) (P) 24.95
- ☐ INVASION ORION (C) (D) (AP-T) 24.95
- ☐ INVASION ORION (C) (P) 24.95
- ☐ TEMPLE OF APSHAI (D) (AP-T) 29.95
- ☐ TEMPLE OF APSHAI (C) (P-T) 29.95
- ☐ DATESTONES OF RYN (D) (C) (AP-P) 19.95
- ☐ DATESTONES OF RYN (C) (P) 19.95
- ☐ MORLOC TOWER (C) (D) (AP-T) 19.95
- ☐ MORLOC TOWER (C) (P) 19.95
- ☐ RESCUE AT RIGEL (C) (D) (AP-T) 24.95
- ☐ RESCUE AT RIGEL (C) (P) 24.95
- ☐ HELLFIRE WARRIOR (C) (D) (AP-T) 29.95
- ☐ HELLFIRE WARRIOR (C) (P) 29.95

BIG FIVE SOFTWARE

- ☐ ATTACK FORCE (T) 14.30
- ☐ GALAXY INVASION (T) 14.30

BIG FIVE SOFTWARE

- ☐ METEOR MISSION (T) 9.75
- ☐ SUPER NOVA (T) 14.30
- ☐ COSMIC FIGHTER (T) 14.30

COMPUTER SIMULATIONS COMPANY

- ☐ BATTLE OF BULGE-BASTIGUNE(S-I) 17.95
- ☐ D-DAY INVASION OF NORMANDY (T) 17.95
- ☐ DARK KINGDOM (T) 11.75
- ☐ DOG RACE COLOR ONLY (C) 5.95
- ☐ EMPIRE STRIKES BACK (T) 13.55
- ☐ MINI AIRCADE COLOR (C) 13.55
- ☐ POLARIS COLOR ONLY (C) 5.95
- ☐ SHARK COLOR ONLY (C) 5.95
- ☐ SLOT MACHINE (T) 7.25
- ☐ BATTLE OF NORTH ATLANTIC (T) 13.55
- ☐ STAR CRUISERS (T) 13.55
- ☐ U-BOAT COLOR ONLY (C) 5.95

INSTANT SOFTWARE

- ☐ AIR FLIGHT SIMULATION (AP) 8.95
- ☐ AIRMAIL PILOT (AP) 8.95
- ☐ BASIC PROGRAMMING ASSISTANT (T) 13.55
- ☐ BALL TURRET GUNNER (T) 8.95
- ☐ BATTLEGROUND (T) 8.95
- ☐ CHESS MANAGEMENT (D) (T) 36.55
- ☐ CHESSMATE-80 (T) 17.95
- ☐ THE CUMMANDO (T) 8.95
- ☐ DOSMIC PATROL (T) 13.55
- ☐ DARED FALL (T) 8.95
- ☐ DISASSEMBLER (T) 8.95
- ☐ DISK EDITOR (D) (T) 36.55
- ☐ DISK SORT (D) (T) 17.95
- ☐ DLOG (D) (T) 17.95
- ☐ ENHANCED BASIC (T) 22.50
- ☐ FLIGHT-PATH (T) 8.95
- ☐ INVESTORS PARADISE (T) 8.95
- ☐ IRV (T) 22.50
- ☐ IRV (D) (T) 27.55
- ☐ JET FIGHTER PILOT (T) 13.55
- ☐ MONEY MACHINE (T) 8.95
- ☐ NIGHT FLIGHT (T) 8.95
- ☐ ONE D MAILING LIST (D) (T) 22.50
- ☐ OTHELLO (T) 8.95
- ☐ PETE UTILITY (T) 8.95
- ☐ PROGRAMMER'S CONVERTER (T) 8.95
- ☐ SANTA PARAVIA MACCIO (AP-T-P) 8.95
- ☐ SKIRMISH-80 (T) 8.95
- ☐ TERMINAL-80 (T) 22.50
- ☐ TLDIS (T) 13.55
- ☐ UTILITY I ORIC (T) 7.25
- ☐ WINNERS DELIGHT (T) 8.95
- ☐ WORDSLINGER (T) 26.00

PERSONAL SOFTWARE

- ☐ CCA DATA MGMT (D) (AP) 85.00
- ☐ CCA MGMT TRAINER (D) (AP) 65.00
- ☐ DESK TOP PLAN (II) (AP) 85.00
- ☐ MONTY MONOPOLY (D) (AP) 31.55
- ☐ VISICALC (D) (AP) 125.00
- ☐ VISITREM (D) (AT) 170.00
- ☐ ZORK (T) (D) 35.95

QUALITY SOFTWARE

- ☐ 3D TIC TAC TOE (C) (T) 13.55
- ☐ 6502 DISASSEMBLER (AT) 10.55
- ☐ ATARI ASSEMBLER (AT) 22.50
- ☐ ASTEROIDS IN SPACE (D) (AP) 17.95
- ☐ BATTLESHIP COMMANDER (AP) 13.55
- ☐ BATTLESHIP COMMANDER (D) (AP) 17.95
- ☐ FASTGAMMON (D) (AP-T) 22.50
- ☐ FASTGAMMON (AP-T-AT) 17.95
- ☐ FORTH (T) (AT) 70.00
- ☐ FRACAS ADVENTURE (AP) 17.95
- ☐ FRACAS ADVENTURE (T) (AP) 22.50
- ☐ BENEATH APPLE MANNOR (AP) 13.55
- ☐ BENEATH APPLE MANNOR (D) (AP) 17.95
- ☐ QS LIGHT PEN (T) 17.95

QUALITY SOFTWARE

- ☐ SKETCH 80 (T) 13.55

STRATEGIC SIMULATIONS

- ☐ COMPUTER AMBUSH (D) (AP) 51.50
- ☐ COMPUTER BISMARCK (D) (AP-T) 51.50
- ☐ COMPUTER BISMARCK (T) 42.00
- ☐ COMPUTER CONFLICT (D) (AP) 39.00
- ☐ COMPUTER NAPOLEONICS (D) (AP) 51.50
- ☐ COMPUTER QUARTERBACK (D) (AP) 39.00
- ☐ COMPUTER AIR COMBAT (D) (AP) 51.50
- ☐ WARP FACTOR (D) (AP) 35.00

SUB-LOGIC

- ☐ 3D GRAPHICS (AP) 40.00
- ☐ 3D GRAPHICS (D) (AP) 48.00
- ☐ A2-F5 FLIGHT SIMULATOR (AP) 22.00
- ☐ A2-F5 FLIGHT (D) (AP) 29.00
- ☐ TRI-F5 FLIGHT SIMULATOR (T) 31.00
- ☐ 3D GRAPHICS (T) 26.50

MICRO-SURVEY SOFTWARE

- ☐ ADVENTURE (AP) (T) 25.50
- ☐ ASSEMBLY DEVELOPMENT (D) (T) 80.00
- ☐ BASIC COMPILER (D) (T) 175.00
- ☐ EDITOR ASSEMBLER (T) 25.50
- ☐ FORTRAN COMPILER (D) (T) 80.00
- ☐ LEVEL III BASIC (T) 44.00
- ☐ MUMATH (D) (T) 64.00
- ☐ OLYMPIC DECATHALON (D) (T AP) 20.00
- ☐ OLYMPIC DECATHALON (T) 20.00
- ☐ TYPING TUTOR (AP) (T) 13.55
- ☐ Z-80 SOFTCARD (D) (AP) 280.00
- ☐ 16K RAM BOARD (AP) 165.00

ON LINE SYSTEMS

- ☐ HI RES ADVEN #0 (D) (AP) 11.95
- ☐ HI RES ADVEN #1 (D) (AP) 22.50
- ☐ HI RES ADVEN #2 (D) (AP) 29.00
- ☐ HI-RES FOOTBALL (D) (AP) 36.00
- ☐ HI-RES BASEBALL (D) (AP) 22.50

SIRIUS SOFTWARE

- ☐ STAR CRUISER (AP) (T) 22.50
- ☐ BOTH BARRELS (AP) 31.50
- ☐ CYBER STRIKE (AP) 36.00
- ☐ PHANTOM FIVE (AP) 26.95
- ☐ SPACE EGGS (AP) 26.95

SOURCEBOUND SOFTWARE

- ☐ GALACTIC EMPIRE (AP) (T) 22.50
- ☐ GALACTIC TRADER (AP) (T) 22.50
- ☐ GALACTIC REVOLUTION (AP) (T) 22.50
- ☐ TAWALA'S REDOUBT (AP) (T) 26.95
- ☐ HYPER HEAD ON (AP) (D) 22.50
- ☐ GALAXY WARS (AP) (D) 22.50
- ☐ APPLE GALAXIAN (AP) (T) 22.50
- ☐ TANK COMMAND (AP) (T) 13.55
- ☐ GOLDEN MOUNTAIN (AP) (T) 11.95

BOTTOM SHELF

- ☐ ANALYSIS PAD (AP) (T) 90.00
- ☐ BUSINESS MAIL (T) (T) 100.00
- ☐ CHECKBOOK II (D) (T) 44.50
- ☐ CHECK REGISTER (D) (T) 67.00
- ☐ DATA MANAGER II (D) (T) 67.00
- ☐ LIBRARY 100 (T) 44.50
- ☐ HEAD CRASH (D) (AP) 17.00

SYNERGISTIC SOFTWARE

- ☐ DUNGEON & WILDERNESS (D) (AP) 29.00
- ☐ DUNGEON (AP) 11.50
- ☐ DUNGEON (D) (AP) 15.75
- ☐ ODYSSEY (D) (AP) 27.00
- ☐ WILDERNESS (AP) 15.75
- ☐ WILDERNESS (D) (AP) 18.00

APPARAT

- ☐ NEWDOS/80 (D) (T) 125.00

If you don't see it listed, write... we probably have it in stock!

Check program desired- Complete ordering information and mail entire ad. Immediate Shipments from stock.

KEY:
AT-Atari
AP-Apple
P-Pet
T-TRS-80
C-TRS-80 Color
D-on Disc.
If not marked-Cassette

Ship the above programs as checked to

Mr / Mrs

Address

City

State Zip

I have a _____ name of Computer

with _____ K memory

Signature

Number of Programs Ordered . . . .

Amount of order . . . .

N Y residents add Sales Tax . . . .

Add shipping anywhere in the U S 2.00

Total amount enclosed . . . .

Charge my ☐ Master Charge ☐ Visa

Card No _____ Expires _____

Personal checks please allow 3 weeks.

Mail to:

DIGIBYTE SYSTEMS CORP.
31 East 31st Street, New York, N.Y. 10016
Phone: (212) 889-8975

ATARI is a trademark of ATARI INC
APPLE is a trademark of APPLE COMPUTER INC
TRS-80 is a trademark of TANDY CORP
PET is a trademark of COMMODORE BUSINESS MACHINES
Prices subject to change without notice.

CIRCLE 184 ON READER SERVICE CARD

Mutual Funds, continued...

```
MFTP.BAS

0001 REM MFTP
0010 PRINT
0020 PRINT "1 - INPUT"
0030 PRINT "2 - SAVE"
0040 PRINT "3 - LIST (DATE)"
0050 PRINT "4 - LIST (IND/FUND)"
0060 PRINT "5 - PLOT"
0070 PRINT "6 - STOP"
0080 INPUT "FUNCTION (1-6)",F
0090 ON F GOTO 100,110,120,130,140,150
0100 CHAIN "INPUTD"
0110 CHAIN "SAVED"
0120 CHAIN "LISTD"
0130 CHAIN "LISTF"
0140 CHAIN "PLOTF"
0150 STOP
```

Listing 1. Control program "MFTP".

```
INPUTD.BAS

0001 REM INPUTD
0010 DIM M$(40),D$(40),Y$(40),F$(40),A$(40),V$(40)
0020 INPUT "DATE(M,D,Y)",MO,DO,YO
0030 OPEN #10,"DJI":GOSUB 1000
0040 OPEN #10,"DJT":GOSUB 1000
0050 OPEN #10,"#9":GOSUB 1000
0060 OPEN #10,"3RDCEN":GOSUB 1000
0070 OPEN #10,"CONTRA":GOSUB 1000
0080 OPEN #10,"DEST":GOSUB 1000
0090 OPEN #10,"EQUINC":GOSUB 1000
0100 OPEN #10,"4WALL":GOSUB 1000
0110 OPEN #10,"NICHOL":GOSUB 1000
0120 OPEN #10,"PENN":GOSUB 1000
0130 OPEN #10,"GROWTH":GOSUB 1000
0140 OPEN #10,"NEWERA":GOSUB 1000
0150 OPEN #10,"NEWHOR":GOSUB 1000
0160 OPEN #10,"USGOLD":GOSUB 1000
0170 OPEN #10,"ENERGY":GOSUB 1000
0180 CHAIN "MFTP"
1000 READ #10,S$:PRINT RIGHT$(S$,LEN(S$)-10):V9=0
1010 FOR I=1 TO 39
1020 READ #10 M$(I),D$(I),Y$(I),F$(I),A$(I),V$(I)
1030 V9=V9+VAL(V$(I))/39:NEXT I
1040 M$(40)="9040" DATA "+STR$(MO)
1050 D$(40)=STR$(DO):Y$(40)=STR$(YO):V0=0
1060 INPUT FO:IF FO<0 THEN 1080 :REM("<"=GREATER THAN)
1070 INPUT "DIVIDEND",VO:FO=-FO
1080 AO=VAL(A$(39))+(FO-VAL(F$(1)))/39
1090 F$(40)=STR$(FO):A$(40)=STR$(AO):V$(40)=STR$(VO)
1100 FOR I=1 TO 40
1120 PRINT #10,M$(I),D$(I),Y$(I),F$(I),A$(I),V$(I)
1130 NEXT I
1140 PRINT "CORRECTED PRICE=",FO+V9*39+VO
1145 PRINT "CORRECTED AVERAGE=",AO+V9+VO/39
1150 CLOSE #10:RETURN
```

Listing 2. Program "INPUTD" which permits the user to enter values anytime without discarding any of the weekend values. The values are kept at line 9040 (see Listing 7). Dividends are entered by previously entering the negative of the net asset value (line 1060). The 39 week average is calculated at line 1080.

appreciation while monthly investments are used to purchase shares of a money market fund.

Information Sources

The data used for calculating the averages can be obtained from most city newspapers. The Friday closing price is used for calculation because most papers will carry both mutual fund closings and stock closings in their late Friday or weekend editions. If access can be gained to other days, they may also be used. Again one should watch what the market is doing every day. The computer system is only one of the tools to help an informed investor make intelligent decisions. For example, when the market started a downturn on February 14th, an investor only had three days to react to the 20-point fall. This decline was slightly foreshadowed by the Dow Jones Transportation Average the day before. If an investor was following the market during the week and observing the computer plotted charts, he could have been in a good position to anticipate an exchange signal. Using the automated system and keeping abreast of the market, one is not guaranteed to hit the exact high points or low points, but he is able to smooth the peaks and recognize the trend to make a modest gain or prevent a sharp loss.

To keep abreast of what the market is doing on a daily basis requires only about a 10-15 minute skim of the financial pages of an appropriate newspaper. *The Wall Street Journal* is very popular since it carries almost all of the information in bar chart form. One simply turns to the second to the last page and looks at the daily bar graphs, skims the "Abreast of the Market" columns and then turns inside about five pages to the mutual funds. The procedure is the same every day except for Friday when the data are entered into the computer system.

The averages that have been mentioned are not the only ones that can be tracked.

The Dow Jones Averages are the most popular and easiest to obtain, but some criticize the Dow Jones Averages because of their limited base of 65 companies. The Standard and Poor's 500 accounts for about 85% of the dollar market value of all stocks listed in the New York Stock Exchange. Other indicators that may be reviewed are the money supply M1, the prime interest rate, and indicators monitoring inflation such as the consumer price index.

To keep abreast of what the market is doing on a daily basis requires only about a 10-15 minute skim of the financial pages.

Finally, special situations may be studied. These include rumored bankruptcies, special stock dividends, splits or mergers, and likely earnings and dividend announcements.

Exchange Signals

Below is a description of exchange signals. They are broken into two categories. The first assumes the holdings are invested in a growth-oriented mutual fund, and the second category assumes the holdings are in a money market fund.

1. Holdings in a Mutual Fund: If the price per share of the fund (corrected for dividends) falls below its average (corrected for dividends) while either or both the Dow Jones Industrial and Transportion Averages fall below the average, exchange holdings in the mutual fund for a money market fund. (In any case if the mutual fund falls below the average consider exchanging funds even if the market is up.)

2. Holdings in a Money Market Fund: If the price per share of the mutual fund (corrected for dividends) rises above its average (corrected for dividends) while either or both the Dow Jones Industrial and Transporation Averages rise above the average, exchange holdings in the money market fund for a mutual fund.

System Description

With the working useful criteria in mind, a desirable, off-the-shelf, personal computer is a video desktop microcomputer system having 32K bytes of memory, a floppy disk subsystem providing at least 100K

ALL THE PROGRAMS YOU'LL EVER NEED. FOR $600.

Say goodbye to the costs and frustrations associated with writing software: The Last One® will be available very soon.

More comprehensive and advanced than anything else in existence, The Last One® is a computer program that writes computer programs. Programs that work first time, every time.

By asking you questions in *genuinely* plain English about what you want your program to do, The Last One® uses those answers to generate a totally bug-free program in BASIC, ready to put to immediate use.

What's more, with The Last One,® you can change or modify your programs as often as you wish. Without effort, fuss or any additional cost. So as your requirements change, your programs can too.

In fact, it's the end of programming as you know it.

And if, because of the difficulties and costs of buying, writing and customising software, you've put off purchasing a computer system up to now, you need delay no longer.

The Last One® will be available very soon from better computer outlets. To place your order, take this ad into your local dealer and ask him for further details. Or in case of difficulty, please write to us direct.

THE LAST ONE®

YOU'LL NEVER NEED BUY ANOTHER PROGRAM.

D J Al Systems Ltd., Ilminster, Somerset, England TA19 9BQ. Telephone: 011-44-4605-4117. Telex: 46338. ANYTYR G

```
SAVED.BAS

0001 REM SAVED
0010 DIM M$(40),D$(40),Y$(40),F$(40),A$(40),V$(40)
0030 OPEN #10,"DJI":GOSUB 1000
0040 OPEN #10,"DJT":GOSUB 1000
0050 OPEN #10,"#9":GOSUB 1000
0060 OPEN #10,"3RDCEN":GOSUB 1000
0070 OPEN #10,"CONTRA":GOSUB 1000
0080 OPEN #10,"DEST":GOSUB 1000
0090 OPEN #10,"EQUINC":GOSUB 1000
0100 OPEN #10,"44WALL":GOSUB 1000
0110 OPEN #10,"MICHCL":GOSUB 1000
0120 OPEN #10,"PENN":GOSUB 1000
0130 OPEN #10,"GROWTH":GOSUB 1000
0140 OPEN #10,"NEWERA":GOSUB 1000
0150 OPEN #10,"NEWHOR":GOSUB 1000
0160 OPEN #10,"USGOLD":GOSUB 1000
0170 OPEN #10,"ENERGY":GOSUB 1000
0180 CHAIN "MFTP"
1000 READ #10,S$:PRINT RIGHT$(S$LEN(S$)-10)
1010 FOR I=1 TO 39
1020 READ #10,M$(I),D$(I),Y$(I),F$(I),A$(I),V$(I)
1030 NEXT I:SCRATCH#10:PRINT#10,S$
1040 FOR I=2 TO 40
1050 M$(I)=STR$(8999+I)+" DATA "+RIGHT$(M$(I),LEN(M$(I))-10)
1060 PRINT #10,M$(I),D$(I),Y$(I),F$(I),A$(I),V$(I)
1070 NEXT I:CLOSE#10:RETURN
```

Listing 3. Program "SAVED" that updates the 39 week data files by discarding the oldest value in FIFO fashion.

```
LISTD.BAS

0001 REM LISTD
0005 LINE= 120
0010 INPUT "DATE(M,D,Y)" ,MO,DO,YO
0020 FOR I=1 TO MO:READ M$:NEXT I
0025 M$=M$+" "
0026 DATA JAN,FEB,MAR,APR,MAY,JUNE
0027 DATA JULY,AUG,SEPT,OCT,NOV,DEC
0028 PRINT M$,STR$(DO)+",",19"+STR$(YO)
0030 OPEN #10,"DJI":GOSUB 1000
0040 OPEN #10,"DJT":GOSUB 1000
0050 OPEN #10,"#9":GOSUB 1000
0060 OPEN #10,"3RDCEN":GOSUB 1000
0070 OPEN #10,"CONTRA":GOSUB 1000
0080 OPEN #10,"DEST":GOSUB 1000
0090 OPEN #10,"EQUINC":GOSUB 1000
0100 OPEN #10,"44WALL":GOSUB 1000
0110 OPEN #10,"MICHCL":GOSUB 1000
0120 OPEN #10,"PENN":GOSUB 1000
0130 OPEN #10,"GROWTH":GOSUB 1000
0140 OPEN #10,"NEWERA":GOSUB 1000
0150 OPEN #10,"NEWHOR":GOSUB 1000
0160 OPEN #10,"USGOLD":GOSUB 1000
0170 OPEN #10,"ENERGY":GOSUB 1000
0180 CHAIN "MFTP"
1000 READ #10,S$
1005 S$=RIGHT$(S$LEN(S$)-10)
1006 S$=LEFT$(S$+"                              ",25)
1010 FOR I=1 TO 39
1020 READ #10,M$,D$,Y$,F$,A$,V$
1030 IF VAL(V$) THEN 1070
1040 IF VAL(D$) THEN 1070
1050 IF M$=(RIGHT$(M$,LEN(M$)-10)) THEN 1070
1060 FO=VAL(F$):AO=VAL(A$):F$="###.##"
1061 PRINT USING F$,S$,FO,AO
1062 CLOSE #10:RETURN
1070 NEXT I:CLOSE#10:RETURN
```

Listing 4. Program "LISTD" which produces a listing of the values of the indicators and funds for a particular date.

GLOSSARY

Mutual Fund: Fund managed by a staff of professional money managers that buys 30 to 100 stocks and offers a prorated share in them to an investor.

Telephone Switch Option: A privilege a fund gives an investor to exchange shares of one fund for shares of other funds in a fund group on the basis of net asset values.

Net Asset Value: The market value of all securities owned by a fund plus other assets, less all liabilities, divided by the number of shares outstanding.

Dow Jones Averages: A running average calculated from stocks selected by Dow Jones & Co., Inc. that indicates to the investor how he would have done if his money was spread proportionately over every dollar's worth of every security listed in the index.

Prospectus: A document issued by the fund at the time securities are offered to provide buyers or potential buyers with pertinent details and data on the fund and the security being offered.

Front Loaded Fund: A mutual fund sold by a salesman who gets a commission for doing so—usually an 8% "load" skimmed off the principal. The funds can be recognized from the financial pages of the newspaper by the *inequality* of bid and asked.

bytes of on-line storage, and a printer/plotter subsystem capable of medium resolution graphics. The minimum software requirements are an extended Basic with files and strings, and an operating system with the usual editing, file management and related utility conveniences. Most of the popular personal computer manufacturers supply all these things.

The personal computer system described above can be purchased for about $2000. This may seem a considerable outlay, but if the system is used to manage a $10,000 investment with an anticipated annualized compounded growth rate of 20%, the amortization period is about one year. The personal computer system is necessary because it is a commitment to attend to the details in pursuit of the objectives discussed earlier, and is advantageous since it minimizes the time and effort required do so. Keep in mind that the computer has other, unrelated uses such as maintaining a mailing list, or household inventory, balancing the checkbook, game playing, etc. Also the cost of your personal computer may be tax deductible if it is used primarily for this money management system.

Software Overview

The software described below is fairly system independent, with the exception of disk file statements and plotter drivers. The programs were implemented on two different computer systems of dissimilar hardware design and remained functionally the same. Using the DATA statement the data files are structured as program files to facilitate initialization and transfers between computers through EIA serial links. The programs in Listings 1 through 6 are written in Percom Super Basic for the SWTPC 6800 computer system.

To maximize memory utility the software is organized in overlaid form. The control program, called Mutual Funds Tracking Program, provides the user with a menu from which to select I/O functions. The program then calls the appropriate program to perform the function and call "MFTP." Program overlays are accomplished using the CHAIN statement which is a combination of the LOAD and RUN commands.

The six I/O functions are: input values by fund or indicator for a particular date, save weekend values, produce a hardcopy list of 39 weekend values for a particular date, plot 39 weekend values for a fund or indicator, produce a hardcopy list of weekend values for a fund or indicator, and STOP. The STOP does not require a user supplied program.

Program "INPUTD" permits the user to enter values any time without discarding any of the weekend values. This capability is very useful when the market trends indicate change and an exchange signal may occur soon. The values are kept at line 9040 in the data files. Dividends are entered by previously entering the negative

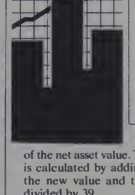
```
0001 REM LISTF
0010 S=0:I=0:PRINT"SELECT:":GOTO 100
0030 OPEN #10,"DJI":GOSUB 1000
0040 OPEN #10,"DJT":GOSUB 1000
0050 OPEN #10,"#9":GOSUB 1000
0060 OPEN #10,"3RDCEN":GOSUB 1000
0070 OPEN #10,"CONTRA":GOSUB 1000
0080 OPEN #10,"DEST":GOSUB 1000
0090 OPEN #10,"EQUINC":GOSUB 1000
0100 OPEN #10,"#4WALL":GOSUB 1000
0110 OPEN #10,"NICHOL":GOSUB 1000
0120 OPEN #10,"PENN":GOSUB 1000
0130 OPEN #10,"GROWTH":GOSUB 1000
0140 OPEN #10,"NEWERA":GOSUB 1000
0150 OPEN #10,"NEWHOR":GOSUB 1000
0160 OPEN #10,"USGOLD":GOSUB 1000
0170 OPEN #10,"ENERGY":GOSUB 1000
0180 INPUT S
0190 ON S GOTO 30,40,50,60,70,80,90,100,110,120
0200 S=S-10: ON S GOTO 130,140,150,160,170
1000 READ #10,S$
1005 I=I+1:READ#10,T$
1010 PRINT I,RIGHT$(T$,LEN(T$)-10):CLOSE#10:RETURN
1020 READ #10,T$
1021 PRINT RIGHT$(T$,LEN(T$)-10)
1030 FOR I=1 TO 39
1040 READ #10,M$,D$,Y$,F$,A$,V$
1050 OIGITS= 0:M$=STR$(VAL(RIGHT$(M$,LEN(M$)-10)))
1060 M$=M$+"/"+D$+"/"+Y$:FO=VAL(A$)
1061 F$="###.##"
1062 PRINT USING F$,M$,FO,AO
1070 NEXT I:CLOSE #10:CHAIN"MFTP"
```

Listing 5. Program "LISTF" which produces a listing of the 39 week data set for an indicator or fund.

```
OJT.OAT

9000 DATA DJT
9001 DATA 10,12,79,242.89,238.00,0.00
9002 DATA 10,19,79,231.20,238.29,0.00
9003 DATA 10,26,79,228.53,238.54,0.00
9004 DATA 11,2,79,232.81,239.04,0.00
9005 DATA 11,9,79,232.86,239.58,0.00
9006 DATA 11,16,79,241.33,240.35,0.00
9007 DATA 11,23,79,243.67,241.25,0.00
9008 DATA 11,30,79,245.47,242.06,0.00
9009 DATA 12,7,79,254.29,243.00,0.00
9010 DATA 12,14,79,254.24,243.89,0.00
9011 DATA 12,21,79,254.53,244.64,0.00
9012 DATA 12,28,79,253.26,245.13,0.00
9013 DATA 1,4,80,251.31,245/59,0.00
9014 DATA 1,11,80,252.49,246.59,0.00
9015 DATA 1,18,80,263.68,246.43,0.00
9016 DATA 1,25,80,275.66,247.69,0.00
9017 DATA 2,1,80,283.50,249.15,0.00
9018 DATA 2,8,80,305.80,251.28,0.00
9019 DATA 2,15,80,287.20,252.73,0.00
9020 DATA 2,22,80,289.00,254.12,0.00
9021 DATA 2,29,80,289.44,255.56,0.00
9022 DATA 3,7,80,272.84,256.44,0.00
9023 DATA 3,14,80,261.78,256.97,0.00
9024 DATA 3,21,80,250.10,257.19,0.00
9025 DATA 3,28,80,242.21,257.18,0.00
9026 DATA 4,4,80,249.17,257.19,0.00
9027 DATA 4,11,80,250.68,257.30,0.00
9028 DATA 4,18,80,238.17,257.03,0.00
9029 DATA 4,25,80,241.19,256.75,0.00
9030 DATA 5,2,80,247.52,256.55,0.00
9031 DATA 5,9,80,249.66,256.17,0.00
9032 DATA 5,16,80,258.76,255.91,0.00
9033 DATA 5,23,80,265.34,255.82,0.00
9034 DATA 5,30,80,269.23,255.89,0.00
9035 DATA 6,6,80,278.09,256.39,0.00
9036 DATA 6,13,80,277.73,256.71,0.00
9037 DATA 6,20,80,269.02,256.80,0.00
9038 DATA 6,27,80,275.96,257.19,0.00
9039 DATA 7,4,80,283.31,257.66,0.00
```

Listing 7. An example data set (Dow Jones Transportation Average)



```
0001 REM PLOTF
0004 STRING= 39:U=0
0005 DIM FO(39),AO(39),F$(15),G$(15)
0010 S=0:I=0:PRINT"SELECT:":GOTO 100
0030 OPEN #10,"OJI":GOSUB 1000
0040 OPEN #10,"OJT":GOSUB 1000
0050 OPEN #10,"#9":GOSUB 1000
0060 OPEN #10,"3RDCEN":GOSUB 1000
0070 OPEN #10,"CONTRA":GOSUB 1000
0080 OPEN #10,"DEST":GOSUB 1000
0090 OPEN #10,"EQUINC":GOSUB 1000
0100 OPEN #10,"#4WALL":GOSUB 1000
0110 OPEN #10,"NICHOL":GOSUB 1000
0120 OPEN #10,"PENN":GOSUB 1000
0130 OPEN #10,"GROWTH":GOSUB 1000
0140 OPEN #10,"NEWERA":GOSUB 1000
0150 OPEN #10,"NEWHOR":GOSUB 1000
0160 OPEN #10,"USGOLO":GOSUB 1000
0170 OPEN #10,"ENERGY":GOSUB 1000
0180 INPUT S
0190 ON S GOTO 30,40,50,60,70,80,90,100,110,120
0200 S=S-10: ON S GOTO 130,140,150,160,170
1000 IF S▯▯O THEN 1020:REM ("▯▯"=NOT EQUAL TO)
1005 I=I+1:READ#10,T$
1010 PRINT I,RIGHT$(T$,LEN(T$)-10):CLOSE#10:RETURN
1020 READ #10,T$
1021 PRINT RIGHT$(T$,LEN(T$)-10)
1030 FOR I=1 TO 39
1040 READ #10,M$,D$,Y$,F$,A$,V$
1060 IF I▯▯1 THEN 1080
1070 L=VAL(F$)
1080 FO(I)=VAL(F$):VO=VO+VAL(V$)
1090 AO(I)=VAL(A$)+VO
1100 IF FO(I)▯U THEN 1120
1110 U=FO(I)
1120 IF FO(I)▯L THEN 1140
1130 L=FO(I)
1140 NEXT I
1150 FOR I=1 TO 39:FOR J=1 TO 15
1155 P$(J)=" ":NEXT J
1157 IF AO(I)▯L THEN 1170
1160 P$(1+INT((14*(AO(I)-L)/(U-L)))="-"
1170 P$=(1+INT((14*(FO(I)-L)/(U-L)))="+"
1180 FOR J=1 TO 15
1190 G$(16-J)=G$(16-J)+P$(J)
1200 NEXT J:NEXT I
1210 FOR I=1 TO 15:PRINT G$(I):NEXT I
1220 CLOSE#10:INPUT"HARDCOPY (Y/N)",R$:IF R$="Y" THEN 1240
1225 IF R$▯▯"N" THEN 1220
1230 CHAIN "MFTP"
1240 PRINT #0,RIGHT$(T$,LEN(T$)-10)
1250 PRINT #0," ":PRINT#0,U
1260 FOR J=1 TO 15:PRINT#0,G$(J):NEXT J
1270 PRINT #0,L:CHAIN"MFTP"
```

Listing 6. Program "PLOTF" used to produce the plots in Figure 1.

of the net asset value. The 39-week average is calculated by adding the difference of the new value and the first week value divided by 39.

Program "SAVED" updates the 39-week data files by discarding the oldest value in FIFO fashion. It also allows the user to back up disk files for a single disk drive system.

Programs "LISTD" and "LISTF" allow the user to obtain hardcopy listings of the 39-week data set for an indicator or fund, or of the values of the indicators and funds for a particular date.

Program "PLOTF" was specially written for this article since the software required to drive a plotter depends on the plotter firmware, if any. The program will produce a low resolution, soft or hardcopy, 39-week plot of the value and corrected average of a fund or indicator. Plots of the Dow Jones Industrial and Transportation Averages and example funds are given in Figure 1.

Getting Started

Once the software is installed and debugged, and the last 39 weeks of data are stored, experimentation with the market and the computer system for about one month is recommended. This way a feel for the market can be acquired and experience with obtaining and using four more data points will uncover most faults the system may have initially. This will also allow time to collect prospectuses from selected funds. The prospectus is a document issued by the fund at the time securities are offered to provide buyers or potential buyers with pertinent details and data on the fund and the security being issued. To get a prospectus simply write to the fund and ask for one. Funds that do not offer the telephone switch option should not be considered. The market can change radically in less than five to ten days and your buy or sell request could get lost in the mail. Some fund groups that have the telephone switch option are:

THE COMPUTRONICS INC.

...EVERYTHING YOUR TRS-80™...

TRS-80 is a trademark of the Radio Shack Division of Tandy Corporation

★ *All Orders processed within 24-Hours*
★ *30-Day Money Back Guarantee on all Software (less a $3 penalty for handling)*
★ *10-Day Money Back Guarantee on Disk Drives and Printers* **PLUS** *120-Days Free Service*

- **LEARNING LEVEL II** By David Lien
  The Original Author Of The Level Manual
  A Step By Step approach to Learning Level II especially geared to new TRS-80™ Owners
  $15.95

- **TRS-80™ DISK AND OTHER MYSTERIES**
  Over 100 pages of indespensible information for disk owners. Learn to recover information from bad disks, how to make Basic programs unlistable, and 12 more chapters of never published tips and information. Written by H.C. Pennington.
  (For all Disk Owners).
  $22.50

NEW SBSG BUSINESS SYSTEM FOR MODEL I OR MODEL II - IN STOCK
- General Ledger
- Accounts Receivable
- Accounts Payable
- Payroll
- Inventory Control with Invoicing

- Each module can be operated individually or as a coordinated **SYSTEM**. Turn-Key error catching operation for beginners
- Complete manual and documentation accompany each program
- Minimum System requirements 2-Disk Drives for Model I, 1-Disk Drive for Model II
- Each module can be formatted to span data on up to 4-Disk Drives
- Free 30-Day telephone consultation
- Call for complete specifications
- Model I Version **$125.00** Per Module
  $495.00 Per System
- Model II Version **$225.00** Per Module
  $995.00 Per System

DATA MANAGEMENT SYSTEMS
- DMS replace index cards or any date requiring long lists of information
- **TBS** In-Memory Information System
  (For Cassette Systems) **$39.95**
- TBS Disk Data Manager (Requires 1 or more disk drives) ..Set up fast random access, files in minutes ..Stores up to 320K of information on 4 Drives ..Up to 10 fields and 255 characters per record ..Supports upper and lower case RS-232 or TRS-232 ..Features complete editing **$48.50**
- Personal Software CCA Data Management System...Completely user onranted, menu drive, 130 page Step By Step Manual ..Capable of inventory control, sorting data, reporting data in nearly any form (for reports and mailing labels). Sorts data by up to 10 fields for zip code, balance due, geographic location or whatever. Prints reports with subtotals and totals automatically calculated. Fast random access **$75.00**

FROM RACET COMPUTES
- **REMODEL-PROLOAD** - Renumbers program lines, combines programs. The only renumber program that will renumber the middle of a program. Specify 16K, 32K or 48K. Works with Cassette or Disk **$34.95**
- **QSF** - Use in your Basic Programs for Instant Sorting (will sort 1000 items in 9 seconds). Other commands include Compress and Uncompress Data, Duplicate Memory, Display Screen Controls and Fast Graphic Controls **$24.95**
  (For Cassette or Disk, specify 16K, 32K or 48K)
- **DOSORT** - All D.S.F. commands plus special Multiple Disk Sorting Routines **$34.95**
  (Specify 32K or 48K)
- **INFINITE BASIC** - Adds 70 commands to your TRS-80™ including Instant Sort, Matrix Commands, String Commands, Left and Right Justification, String Centering, Simultaneous Equations, Upper and Lower Case Reverse and more (For Cassette or Disk) **$49.95**
- **INFINITE BUSINESS** (Requires Infinite Basic) Eliminate Round-off error, 127-Digit Calculation Accuracy, Insert New Elements in Sorted Arrays, Automatic Page Headings, Footings and Pagination, Multiple Precision Arithmetic and more (For Cassette or Disk) **$29.95**
- **COPSYS** - Copy Machine Language Programs (For Cassette Only) **$14.95**
- **DSM** (Disk Sort Merge) **$75.00**

FROM SMALL SYSTEM SOFTWARE
- **RSM-2** Machine Language Monitor **$26.95**
- **RSM-2D** Disk Version of RSM-2 **$29.95**
- **DCV-1** Converts Machine Lanuage Programs from tape to disk **$9.95**
- **AIR RAID** - The ultimate TRS-80™ game converts your TRS-80™ into a real time shooting gallery **$14.95**

- **BARRICADE** - A fast pong style game **$14.95**
- **CPM** - (For Disk Only) **$150.00**
- **TRS-232 INTERFACE** - Interface with Software driver RS-232 printers to your TRS-80™ **$49.95**
- **TRS-232 FORMATTER** - Additional (optional) Software for TRS-232 owners. Adds many printer commands to your TRS-80™ **$14.95**
  (With purchase of TRS-232) **$9.95**
- **PENMOD** - Use the Electric Pencil with RS's lower case modification **$19.95**

FROM GALACTIC SOFTWARE
- **MAIL PAC** - For Model I Disk Systems only **$99.95**
  Quick-sorting full user control over mailing list from Galactic Software.
- **STOCK MARKET PAC** **$99.95**

FROM APPARAT NEW DOS + **$99.95**
35, 40 and 77 Track Versions available
- **NEW DOS/80** (With variable record length files, chainings and many other features **$149.95**

FROM THE BOTTOM SHELF
- **CHECKBOOK II** (For Cassette or Disk) **$39.95**
- **SYSTEMDOCTOR** (A complete diagnosis of your TRS-80™. Checks memory, video, cassette, disk, ROM, and all other parts of your system)
  For Cassette or Disk **$29.50**
- **CHECKBOOK REGISTER ACCOUNTING SYSTEM** (Requires 2 disk drives) **$75.00**
- **LIBRARY 100** - 100 established business, game and educational programs plus **FREE** Tiny Pilot all for **$49.50**
- **BASIC TOOL KIT** - Lists all variables, GOTO's and GOSUB's in your program **$19.80**

- **SOUNDWARE** - Adds sound to your TRS-80™ Just plug it in **$29.95**
  Sample programs included.
- **TING TONG** - Can be used with Soundware for a Sound version of pong **$9.95**

- **VIC - The Carta Visual Instructional Computer Program** **$19.95**
  The Level II 16K Cassette is designed to teach beginners the Basics of Machine Language and Assembly Language Programming. See every Machine Language Instruction Display on your video. VIC includes Step By Step 55 page manual

VISTA V80 DISK DRIVE - 110K of Storage **$395.00**
Add $29.95 for Cable (Free with purchase of 2-Disk Drives) 10 day money back guarantee

FROM HOWE SOFTWARE
- **MON-3** - Machine Language Programming for beginners. MON-3 is a complete System Monitor with Users Manual **$39.95**
- **MON-4** - Disk Version of MON-3 **$49.95**

FROM MICROSOFT
- **LEVEL III BASIC** **$49.95**
  Now Cassette owners can edd Disk Commands to their TRS-80™ without owning a Disk Drive
- **MICROSOFT DISK ADVENTURE** **$29.95**
- **TRSDOS BASIC COMPILER** **$195.00**
  Run Basic Programs up to 15 times faster

- **NEC BUSINESS QUALITY PRINTERS** (For MOD-I or MOD-II) **$2,995.00**

THE ELECTRIC PENCIL
Cassette **$99.95**
Disk **$150.00**
MOD-II Version **$325.00**

- **HORSE SELECTOR II** By Dr. Hal Davis
  The TRS-80™ version updated for the TRS-80™ and originally reviewed in Systems and Methods **$50.00**

...EVERYTHING... FOR MOD-II OWNERS

NEW MOD-II NEWSLETTER MOD-II Catalog Free w/subscription	**$12/year**
MAIL PAC	**$199.95**
MICROSOFT BASIC COMPILER	**$395.00**
MICROSOFT BASIC	**$325.00**
GSF SORT ROUTINE	**$50.00**
CP/M	**$170.00**
PEACHTREE BUSINESS SOFTWARE	**Call**
WORD STAR	**$495.00**

THE COMPUTRONICS INC.
MATHEMATICAL APPLICATIONS SERVICE

50 N. PASCACK ROAD
SPRING VALLEY, NEW YORK 10977

HOURS: 9-5
Monday thru Saturday

48-Page Catalog $2 **FREE** *With Any Order*
Order By Phone Or Mail
Add $1 Per Order For Shipping Within UPS Areas
Add $3 For C.O.D.
Add $3 For All Foreign And Non-UPS Shipments
Add $3 For UPS Blue Label

24 HOUR ORDER LINE
(914) 425-1535

NEW TOLL-FREE ORDER LINE
(OUTSIDE OF N.Y. STATE)
(800) 431-2818

COMPUTRONICS
MATHEMATICAL APPLICATIONS SERVICE

EVERYTHING

50 N. PASCACK ROAD
SPRING VALLEY, NEW YORK 10977

* APPLE IS A TRADEMARK OF THE APPLE CORP.

FOR YOUR APPLE* II

★ All orders processed within 24-Hours
★ 30-Day money back guarantee on all Software (less a $3 penalty for handling)

FROM COMPUMAX BUSINESS SYSTEMS

The COMPUMAX business applications programs are written with the novice computer user in mind. They are easy to use, yet powerful in their capabilities. Further, COMPUMAX supplies the BASIC source code. Thus the programs are easy to modify.

MICROLEDGER

This General Ledger system performs the essential functions of dual entry bookkeeping and matches revenues and expenses.
MICROLEDGER includes the following programs:
LEDGER 1 - builds and maintains the CHART OF ACCOUNTS file. This file contains both current and accumulated totals for each account.
LEDGER 2 - builds and updates the JOURNAL TRANSACTION file.
LEDGER 3 - lists both the the JOURNAL file and the CHART OF ACCOUNTS.
LEDGER 4 - computes the TRIAL BALANCE and may display POSTING of journal transactions into the CHART OF ACCOUNTS. An AUDIT TRIAL of all transaction is output.
LEDGER 5 - produces the PROFIT AND LOSS STATEMENT
LEDGER 6 - produces the BALANCE SHEET. Assets, liabilities and owners' equities are shown by account and by totals $140.00

MICROPAY

An Accounts Payable system, MICROPAY includes the following program & functions:
PAY 1 - initializes both Transaction and Master files, then begins the Accounts Payable process by inputting and adding records in the Transaction file.
PAY 2 - allows for changes and deletions of Transaction and Master records.
PAY 3 - reports outstanding Accounts Payables in four categories, under 30 days, 31-60 days, 61-90 days, and over 90 days
PAY 4 - reports all outstanding Accounts Payables for a single customer or for all customers, and computes Cash Requirements.
PAY 5 - reports all outstanding Accounts Payables for a single date or for a range of dates and computes the Cash Requirements
PAY 6 - lists both the Transactions and Master files
PAY 7 - prints checks and accumulates and journalizes Accounts Payables. This program simultaneously creates entries for the MICROLEDGER file. $140.00

MICRORec

An Accounts Receivable system, MICRORec includes the following programs and functions:
REC 1 - initializes Accounts Receivable files, adds A/R record and prints invoices.
REC 2 - accepts receipt of customer payments and changes or deletions of A/R Transactions or Master file records.
REC 3 - reports outstanding Accounts Receivables in four categories, under 30 days, 31-60 days, 61-90days, and over 90 days
REC 4 - reports all outstanding Accounts Receivables for a single customer, or for all customers and computes Cash Projections
REC 5 - produces reports for all outstanding Accounts Receivables for a single date or for a range of dates and computes Cash projections
REC 6 - lists Transaction and Master files and accumulates and journalizes Accounts Receivables, creating JOURNAL entries which communicate with the MICROLEDGER JOURNAL file $140.00

MICROINV

This Inventory Control system presents a general method of Inventory Control and produces several important reports. Its program includes:
INV 1 - initializes the Transaction and Master and adds and updates Transaction and Master records
INV 2 - handles inventory issued or received, creating inventory records. This program also accumulates and journalizes transactions, producing JOURNAL entries which communicate with the MICROLEDGER file
INV 3 - lists both Transaction and Master files.
INV 4 - produces the STOCK STATUS REPORT, showing the standard inventory stock data and stock valuation, and the ABC ANALYSIS breaking down the inventory into groups by frequency of usage
INV 5 - prints a JOB COST REPORT/MATERIALS, showing allocation of materials used year-to-date by each job or work code (This is complemented by the Job Cost Report/ Personnel in the MICROPERS program)
INV 6 - computes and provides the E.O.Q. (Economic Order Quantities) ... $140.00

MICROPERS

This is a Payroll/Personnel program whose functions include:
PERS 1 - initializes the Master file and allows for entry and updates of Master records
PERS 2 - initializes the Payroll file and allows for entry and updates of payroll records
PERS 3 - lists an Employee Master Record or the entire Employee Master file; lists a single Payroll Record or the entire Payroll file
PERS 4 - computes Payroll and prints the PAYROLL REGISTER. Prints PAYCHECKS and creates JOURNAL entries to be fed into the MICROLEDGER JOURNAL file
PERS 5 - produces the JOB COST REPORT/PERSONNEL, computes the quarterly 941 bank deposit, and the Annual W-2 run $140.00

All COMPUMAX programs available in machine readable format (diskette form) for the following machines:

TRS-80™ Model I	Micropolis 1053/11
APPLE II	Microsoft under CP/M
PET	CBASIC under CP/M
	Cromemco

FROM ADVENTURE INTERNATIONAL (By Scott Adams)

† 1. **ADVENTURELAND** - You wander through an enchented world trying to recover the 13 lost treasures. You'll encounter wild animals, magical beings, and many other perils and puzzles. Can you rescue the Blue Ox from the quicksand? Or find your way out of the maze of pits? Happy Adventuring .....

† 2. **PIRATE'S ADVENTURE** - "Yo ho ho and a bottle of rum" You'll meet up with the pirate and his daffy bird along with many strange sights as you attempt to go from your London flat to Treasure Island. Can you recover Long John Silver's lost treasures? Happy Sailing, matey.

3. **MISSION IMPOSSIBLE ADVENTURE** - Good morning, your mission is to... and so it starts. Will you be able to complete your mission in time? Or is the world's first automated nuclear reactor doomed? This one's well named. It's hard, there is no magic, but plenty of suspense. Good luck.

4. **VOODOO CASTLE** - Count Cristo has had a fiendish curse put on him by his enemies. There he lies, with you his only hope. Will you be able to rescue him or is he forever doomed? Beware the Voodoo Man . . .

5. **THE COUNT** - You wake up in a large brass bed in a castle somewhere in Transylvania. Who are you, what are you doing here, and WHY did the postman deliver a bottle of blood? You'll love this Adventure, in fact, you might say it's Love at First Byte

6. **STRANGE ODYSSEY** - Marooned at the edge of the galaxy, you've stumbled on the ruins of an ancient alien civilization complete with fabulous treasures and unearthly technologies. Can you collect the treasures and return or will you end up marooned forever?

7. **MYSTERY FUN HOUSE** - Can you find your way completely through the strangest Fun House in axistence, or will you always be kicked out when the park closes?.

8. **PYRAMID OF DOOM** - An Egyptian Treasure Hunt leeds you into the dark recesses of a recently uncovered Pyramid. Will you recover all the treasures or more likely will you join its denizens for that long eternal sleep?

9. **GHOST TOWN** - Explore a deserted western mining town in search of 13 treasures From rattlesnakes to runaway horses, this Adventure's got them all! Just remember, Pardner, they don't call them Ghost Towns for nothin' (Also includes new bonsai scoring system!) ..... $14.95 Per Adventure

* **Note:** Apple requires 24K and has no lower case
† Recommended for the novice adventurer, with many built-in HELPS!

FROM PERSONAL SOFTWARE INC.

VISICALC $150.00

Take virtually any problem you would explore using calculator, pen, and paper, working in rows and columns. Apply VisiCalc and you'll see why every reviewer of this product has said the same thing: VisiCalc is the most useful, most important program yet developed for personal computing.

With VisiCalc, you work with an electronic worksheet of up to 63 columns and 254 rows. At the juncture of any column and row you can type in words and numbers VisiCalc automatically performs all arithmetic functions, net present value, and transcendental functions - instantly!

CCA DATA MANAGEMENT SYSTEM $74.95

DMS Features:
- Creation and Maintenance
  - Fields may be alphanumeric, numeric, Integer, floating point, or fixed decimal with commas.
  - Fields may be COMPUTED FIELDS. DMS will compute any field within a record, using constants or other fields in the same record. Functions include add, subtract, multiply, divide, and raise exponential powers
  - Records are easily located, using the SCAN feature. SCAN for records with a field over, below, or between a range of values.
  - Records are easily added and updated. DMS "prompts" you with questions.
  - Multi-diskette capability for files - up to 65,000 characters per file!
  - Sort the records into almost any order, using up to 10 fields as "keys" So you can sort for customer numbers, within zip code, for instance.
  - Delete records, "compact" files, and backup files on data diskettes easily.

Report Features:
- Print reports with records in any order
- Select fields to be printed.
- Print mailing labels.
- Numeric totals and subtotals can be specified when a value in an unrelated field in the same record changes For example, sort, subtotal, and print according to department, or month, or customer number, or model number.

GUARANTEED PROFIT 91% **WINS PLACES SHOWS** 32% **AVERAGE PROFIT AT ALL TRACKS-1978**

THE HORSE SELECTOR II (FLATS) (By Dr. Hal Davis) $50.00

New simplified version of the original Horse Selector. The first Horse Selection System to actually calculate the estimated odds of each horse.
HIGHER PROFITS (OVER 100%) POSSIBLE THROUGH SELECTIVE BETTING ON
- Rates each horse in 10 seconds.
- Easy to follow rules
- Can be used with any Apple II Computer.
- 100% money back guarantee (returned for any reason).
- Uses 4 factors (speed rating, track variant, distance of the present race, distance of the last race)
- Using the above factors, the Horse Selector calculates the estimated odds. BET on horses whose actual payoff (from the Tota Board or Morning Lines) is higher than payoff based on estimated odds.
- Using the above factors, the Horse Selector calculates the estimated odds. BET on any selected horse with an estimated payoff (based on Tota Board or Morning Lines) higher than calculated payoff (based on Horse Selector II).
- Source listing for the TRS-80™, T-1-99, HP-67, HP-41, Apple and BASIC Computers
- No computer or calculator necessary (although a calculator would be helpful for the simple division used to calculate estimated odds)

FREE Dutching Tables allows betting on 2 or more horses with a guaranteed profit.

24 HOUR ORDER LINE
(914) 425-1535

NEW TOLL-FREE ORDER LINE
(OUTSIDE OF N.Y. STATE)
(800) 431-2818

ADD $2.00 FOR SHIPPING UPS AREAS
ADD $3.00 FOR C.O.D. OR NON-UPS AREAS
ADD $4.00 OUTSIDE U.S.A., CANADA & MEXICO

CIRCLE 137 ON READER SERVICE CARD

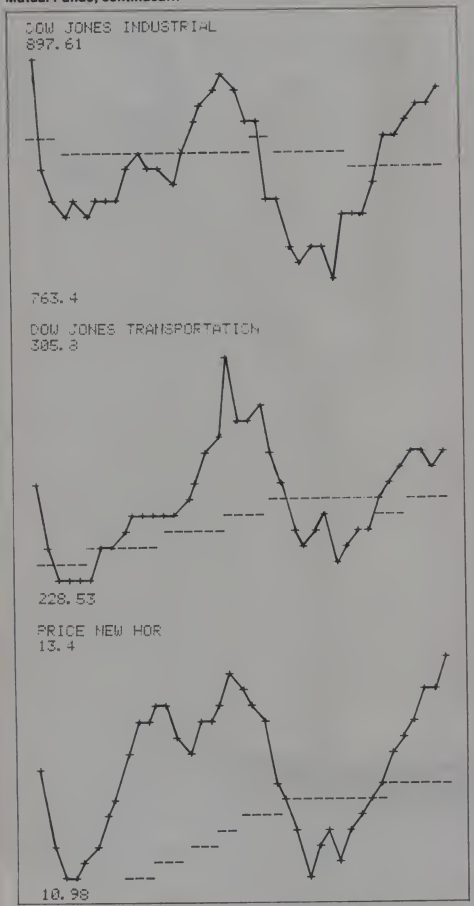


Figure 1. Example plots for the period 2/28/79 to 6/20/80.

Rowe-Price Group
100 East Pratt St.
Baltimore, MD 21202
800-638-1527

Dreyfus Group
600 Madison Ave.
New York, NY 10022
800-223-5525

Financial Programs
P.O. Box 2040
Denver, CO 80201
800-525-9831

Fidelity Group
82 Devonshire St.
Boston, MA 02101
800-225-6190

The Wall Street Journal has plenty of other ads.

The telephone switch option allows an investor simply to pick up the phone when a switch signal occurs and instruct the fund managers to transfer his holding. Each of the above groups has a fairly large collection of funds from which to choose. Generally one should pick an aggressive, growth-oriented fund and high yield money market fund from which to switch back and forth. Each fund group has sales representatives that can advise which of their funds meet the above requirements. As a final bit of advice, front loaded funds should be avoided with this system. □

Disclaimer

As required by the provisions of Rule 206(4)-1 of the Investment Advisers Act of 1940 the authors state that it is not the intent of this magazine article to indicate or imply that any charts, formulae or methods can guarantee profitable results in the future or that they will equal past performances.

Further, readers should be aware that risk is involved in any security transaction and that before investing in any mutual fund or money market fund a current prospectus should be examined. All material presented is believed to be reliable, but accuracy is not guaranteed. The listing of a security or fund in this article does not constitute an offer to buy nor does this listing constitute advice to buy a particular fund.

The reader should also keep in mind that the investment method discussed belongs to the "Chartists" who claim to see in plots of stock prices "resistance levels," "gaps," "flags," etc., which are supposed to improve an investor's chances. Few statisticians believe in these methods.

Any readers having questions or wishing to obtain the programs or data sets used in this article should send an SASE to the address given. The authors will be happy to entertain any inquiries.

DYNACOMP

Quality software for[+]*:*

ATARI
PET
APPLE II Plus

**TRS-80 (Level II)*
NORTH STAR
CP/M 8" Disk

GAMES, SIMULATIONS, EDUCATION and MISCELLANEOUS

BRIDGE 2.0 (Available for all computers) **Price: $17.95 Cassette; $21.95 Diskette**
An all time favorite ..... of this most popular of all games. This program both BIDS and PLAYS either contract or duplicate bridge. Depending on the contract, the computer will either play the virtual hand against you or will play the hand you bid. Both bidding and play are done at a competent level. Bridge 2.0 provides challenging entertainment for advanced players and is an excellent learning tool for the bridge novice.

HEARTS 1.5 (Available for all computers) **Price: $14.95 Cassette; $18.95 Diskette**
An exciting and entertaining card game version of the popular card game. Hearts is a trick oriented game in which the purpose is not to take any hearts or the queen of spades. Play against two computer opponents who are armed with hard to beat playing strategies.

CRIBBAGE (TRS-80 only) **Price: $14.95 Cassette; $18.95 Diskette**
Two player version of the cribbage game. It is an excellent program for the cribbage player who wants to improve his game as well as for the novice seeking a challenging opponent.

STUD POKER (ATARI only) **Price: $13.95 Cassette; $15.95 Diskette**
Two to five players against the computer. The computer deals the cards one at a time and you and the computer bet on what you have. The computer does not cheat and usually bets the odds. However, it sometimes bluffs! Also included as a five card draw poker betting program. This package will run on a 16K ATARI color graphics, sound

POKER PARTY (Available for all computers) **Price: $17.95 Cassette; $21.95 Diskette**
POKER PARTY is a draw poker simulation based on five hand, PURE II by Donald Knuth. The new version of POKER PARTY is available for ..... The player(s) consists of yourself and six other (computer) players. Each of the computer players will bet or leave (more than a different percentage of the time) for a varying purposes — bluff or fold under pressure. Players with PURE POKER I before going to true experience game enough! Apple (source and diskette versions require a 32 K (or larger) Apple II.

NOMINES JIGSAW (Atari, Apple and CBS-80 only) **Price: $16.95 Cassette; $20.95 Diskette**
A square puzzle on your computer! Complete the puzzle by selecting your pieces from the 12 different shapes. NOMINES JIGSAW is a computerized jigsaw puzzle. The graphics and sound are fun to watch and the challenge you with as three levels of difficulty. Scoring is based upon the number of guesses taken and by the difficulty of the board selected.

CRANSTON MANOR ADVENTURE (Atari only) **Price: $19.95**
At last! A comprehensive Adventure game for the North Star. CRANSTON MANOR ADVENTURE utilizes the full 48K of memory. CRANSTON MANOR offers you extremely intricate fabulous creative plot, the finest in graphics, sound and animation. Will give up the treasonic address a light. The number of rooms is greater and the associated descriptions are much more elaborate than the standard computer version of Adventure are greatly increasing the game the top on its class. Plus can be creeped at any time and the status saved on diskette. Requires 32k.

VALDEZ (Available for all computers) **Price: $14.95 Cassette; $18.95 Diskette**
A ..... game based on the Exxon Valdez Sound and Valdez Narrows. The program uses ..... 2K ..... with many challenges and features you display. Features include ..... Valdez Narrows and ..... Requires 16K Atari BASIC or 32K Sandard extension disk to load .ss display.

FLIGHT SIMULATOR (Available for all computers) **Price: $17.95 Cassette; $21.95 Diskette**
A realistic and exciting ..... of take off, flight and landing. The program utilizes ..... graphics, ... sound and ..... to create a real feel. You are given ..... and must land safely on the runway. The more ..... the more ..... you are given.

STARTREK 3.2 (Available for all computers) **Price: $ 9.95 Cassette; $13.95 Diskette**
This is the classic ..... game with several new features. For example: the Klingons now move all the ..... the Klingons ..... which give varying degrees ..... of speed and ..... The Klingons also attack each base and ..... the ..... of the Klingons attack. What do ..... the sequence is ..... when the Enterprise is ..... by four bases ..... and a ..... Requires 16K and a northern VDT is required! The Klingons get ..... more ..... .

CHESS MASTER (North Star and TRS-80 only) **Price: $19.95 Cassette; $23.95 Diskette**
This compact and very powerful program will run on levels of play. It includes castling, en passant capture, and pawn promotion. Additionally, the board may be reset before the start of play, permitting the ..... of "book" plays. To ..... more exact ..... of the ..... the program ..... the ..... of ..... and ..... Requires 16K ..... APPLESOFT ROM ..... Cassette ..... Diskette ..... Full graphics are supported on the ..... Optional ..... of opponent's ..... displays are provided to accommodate North Star users.

BLACK HOLE (Apple only) **Price: $14.95 Cassette; $18.95 Diskette**
This is an exciting graphical simulation of the problem encountered when attempting a black hole with a space pirate. The object is to steer and control your ..... ship into the black hole and ..... to about 15% mass ..... no fuel ..... to get by and the pirate ship. Both ..... ship and ..... have the power and get progressively more difficult the higher you score!

HODGE PODGE (Apple only, 48k larger RAM) **Price: $19.95 Cassette; $23.95 Diskette**
HODGE PODGE is a ..... of many ..... games. This ..... has an Apple wall ..... a diskette ..... and ..... Requires ..... number of the chosen ..... The program ..... graphics, color and sound and ..... diskette ..... HODGE PODGE requires a 48K Apple ..... and ..... Applesoft ROM ..... Some ..... downloads to the ..... diskette.

TEACHER'PET (Available for all computers) **Price: $ 9.95 Cassette; $13.95 Diskette**
TEACHER'PET ..... ASSIGNMENT ..... educational package. Primarily intended for pre-school to grade 1. TEACHER'PET ..... the young student in ..... learning ..... and ..... Requires 16K ..... Cassette ..... Diskette.

SPACE FLIT (Apple only) **Price: $10.95 Cassette; $14.95 Diskette**
Use the game paddles to ..... the flight of the TV screen or "cell" a ..... a ..... to ..... Hyperspace ..... Requires ..... Applesoft ROM ..... Cassette ..... Diskette.

MOVING MAZE (Apple only) **Price: $10.95 Cassette; $14.95 Diskette**
MOVING MAZE requires the ..... game paddles to direct ..... a ..... through ..... Requires ..... Applesoft ROM ..... Cassette ..... Diskette.

ALPHA FIGHTER (Atari only) **Price: $14.95 Cassette; $18.95 Diskette**
Two exciting ..... and ..... programs in one! ALPHA FIGHTER ..... the aliens ..... before ..... Requires ..... Atari BASIC ..... Cassette ..... Diskette.

INTRUDER ALERT (Atari only) **Price: $16.95 Cassette; $20.95 Diskette**
..... a ..... game ..... the ..... Requires ..... Atari BASIC ..... Cassette ..... Diskette.

GIANT SLALOM (Atari only) **Price: $14.95 Cassette; $18.95 Diskette**
..... game ..... Requires ..... Atari BASIC ..... Cassette ..... Diskette.

CRYSTAL NAVIGATOR (Atari only) **Price: $ 9.95 Cassette; $13.95 Diskette**
..... Requires ..... Atari BASIC ..... Cassette ..... Diskette.

CHOMP-OTHELLO (Atari only) **Price: $11.95 Cassette; $15.95 Diskette**
..... Requires ..... Atari BASIC ..... Cassette ..... Diskette.

GAMES PACK I (Available for all computers) **Price: $9.95 Cassette; $13.95 Diskette**
..... Requires ..... Cassette ..... Diskette.

GAMES PACK II (Available for all computers) **Price: $9.95 Cassette; $13.95 Diskette**
..... Requires ..... Cassette ..... Diskette.

NORTH STAR SOFTWARE EXCHANGE (NSSE) LIBRARY **Price $9.95 Diskette**
..... Requires ..... Diskette.

Availability

DYNACOMP software is supplied with complete documentation ..... Many enthusiasts and examples. Unless otherwise ..... programs will run unless ..... programming ..... specific ..... Applesoft ..... Atari ..... Diskette ..... Cassette ..... Diskette ..... TRS-80 Level II ..... Apple Applesoft ..... Atari ..... Diskette ..... North Star ..... Diskette ..... CP/M ..... Diskette ..... Cassette ..... Diskette ..... Cassette ..... Diskette ..... Cassette

Setting The Records Straight

A double-entry system for the home accountant

C. A. Johnson

Everyone who has several small sources of income in addition to his primary employment probably finds, as I did, that keeping books is an unwelcome chore, but one which cannot be avoided if he is to keep on the right side of the Internal Revenue Service.

I had been keeping my books in a standard, double-entry ledger. The system I was using was taken from an example published in a college accounting text book. I made a few minor modifications in the account structure to suit my personal needs, and put it to the test. I found that the double-entry system was delightful for maintaining accuracy, but more time-consuming than I would have liked. Even so, it was a big improvement over the crude, single entry method I had been using. Anyone who has tried to find a subtle error in a single-entry system knows what I am talking about.

When personal computers began to appear on the market at something approaching affordable prices, I knew I had found the answer I needed. The problem remained, however, of how to justify an expenditure of $1000-2000 to keep track of an annual income of $3000-5000. Then word processing programs became available. As a writer, I had my justification (but that is another story). I shopped and finally bought my TRS-80, 16K Level II.

I searched the available software for a suitable accounting program. I found that they all required a minimum of 32K, disk and printer. And they were not cheap. I did not feel ready to put another $2000 into software and more hardware, so I decided to program the system I had been using.

The first problem I encountered was how to handle the required data storage. I estimated that the program would take about 10K of my RAM. Clearly the 5-6K of memory left after loading a program was not enough data storage for much of an accounting program. Tape seemed to provide the answer. Once the decisions were made and the system designed, the programming was a simple matter. It is straightforward programming with no fancy frills.

The Journal Subroutine

The heart of the system is the double-entry journal subroutine. The program is conversational, asking for each data item in turn. For each transaction, debits and credits must balance. When the transaction has been entered, if it balances the program will tell you that it balances and ask if you have another transaction. Regardless of the answer, it will remind you to prepare your recorder for recording.

When you press ENTER, it transmits the data to the recorder. If your reply to the transaction question is "Y," it will initialize and accept new data. If the reply is "N," it will take you back to the menu. Each step is guided by a computer prompt. If you have input a complete transaction, and do not get a "transaction balanced" message, you should check the transaction to see if your data balance, then enter "0" (zero) for the date to reinitialize the subroutine and reenter the entire transac-

81002	PROPRIETORSHIP	31	0.00	4000.00
81002	CASH	11	2500.00	0.00
81002	INVENTORY	12	1000.00	0.00
81002	OFF FURNITURE	14	500.00	0.00
81002	RETAIL SALES	42	0.00	20.00
81002	CASH	11	20.00	0.00
81005	INVENTORY	12	15.00	0.00
81005	CASH	11	0.00	15.00
81006	RETAIL SALES	42	0.00	30.00
81006	CASH	11	30.00	0.00
81007	WHOLESALE SALES	41	0.00	50.00
81007	CASH	11	50.00	0.00
81008	RETAIL SALES	42	0.00	35.00
81008	CASH	11	35.00	0.00
81008	INVENTORY	12	60.00	0.00
81008	CASH	11	0.00	60.00
81012	RETAIL SALES	42	0.00	25.00
81012	CASH	11	25.00	0.00
81012	ADVERTISING	53	12.00	0.00
81012	CASH	11	0.00	12.00
81014	WHOLESALE SALES	41	0.00	80.00
81014	CASH	11	80.00	0.00
81014	INVENTORY	12	125.00	0.00
81014	CASH	11	0.00	125.00
81015	RETAIL SALES	42	0.00	22.00
81015	CASH	11	22.00	0.00
81019	RETAIL SALES	42	0.00	45.00
81019	CASH	11	45.00	0.00
81020	WHOLESALE SALES	41	0.00	65.00
81020	CASH	11	65.00	0.00
81023	RETAIL SALES	42	0.00	68.00
81023	CASH	11	68.00	0.00
81028	WHOLESALE SALES	41	0.00	57.00
81028	CASH	11	57.00	0.00

Figure 1. Sample output from journal subroutine.

C. A. Johnson, 3619 Sugarhill Dr., San Antonio, TX 78230.

EAST COAST
ΩMEGA Sales Co.
12 Meeting St.
Cumberland, RI 02864
1-800-556-7586
1-401-722-1027

ΩMEGA SALES CO.

WEST COAST
ΩMEGA Sales Co.
3353 Old Conejo Rd. #102
Newbury Park, CA 91320
1-800-235-3581
1-805-499-3678

SPECIAL OF THE MONTH!!

INTERTEC SUPERBRAIN 64K RAM $2849

OR TOGETHER FOR ONLY $5195

NEC 5510 SPINWRITER $2395

EPSON MX-80 PRINTER $479
INTERFACES: IEEE $55, TRS•80 $35, APPLE INTERFACE + CABLE $90, RS•232 $70

ATARI 800 $759

DIABLO 630 $1995
Tractor option $200

C-ITOH STARWRITER 25 $1595

NEC MONITOR $219

OKIDATA MICROLINE-83	$949
OKIDATA MICROLINE-80	$469
APPLE II PLUS 48K	$1150
APPLE DISK w/ 3.3 DOS Controller	$545
APPLE DISK w/o Controller	$435
BASE II PRINTER	$649
HAZELTINE 1420	$799
NORTHSTAR HORIZON II 32K QD	$2975
ATARI 400 8K	$399
ATARI 400 16K	$499
RADIO SHACK 16K Level II Model 3	$875
RADIO SHACK 64K Model 2	$3449
ANADEX DP-9500	$1249
TELEVIDEO 912C	$669
TELEVIDEO 920C	$729
TELEVIDEO 950	$1049
ATARI 825 PRINTER	$729
ATARI 850 INTERFACE	$169
ATARI 810 DISK	$449
(Call for price list of ATARI Software)	

- *NO SURCHARGE FOR CREDIT CARDS*
- *WE ACCEPT C.O.D.'S*
- *ALL EQUIPMENT FACTORY FRESH W/MANUFACTURER'S WARRANTY*
- *STOCK SHIPMENTS USUALLY SAME DAY OR NEXT DAY*
- *NO HIDDEN CHARGES - WE LIVE BY OUR PUBLISHED PRICES*

VISA **EAST COAST / WEST COAST** MC

ΩMEGA SALES COMPANY

tion. The program will accept up to 15 entries in each transaction. The final transaction on each journal tape should be a single record containing a date, "LAST ENTRY" and zeroes in the other three fields.

I make my date entry in Julian date form (YYDDD). For those unfamiliar with it, the Julian date is the date given on desk calendars in the form: "This is the xxx day." The first two characters refer to the year. This format makes it easy to select date ranges for reports from consolidated data tapes. However, the date in YYMMDD form works just as well.

When reading the journal tape, the program will continue to read (or try to) until it encounters a record entry with "LAST ENTRY" in the description field. Consequently, it is a good idea to prepare a tape with a single "LAST ENTRY" record on it as described above. This tape will be used to stop the computer from reading the data tape after all the data have been read if you have neglected to put a "LAST ENTRY" record at the end of the journal tape. Otherwise you will have to reset the computer and start over. With it you can stop reading data at any time.

The Balance Sheet Routine

The "balance sheet" routine can be used to provide summary data, if desired, or it can be used as a trial balance. (Figure 2 shows sample balance sheet output.) In the latter case, the trial balance is adjusted by entering new transactions into a journal tape and rerunning the "balance sheet" routine. Naturally, this process may be repeated as many times as necessary to produce the final balance sheet. The adjustment transactions could be retained as a permanent part of the journal record, or the summarized balance sheet may be input as the beginning transactions so that the accounts are initialized at the beginning of each accounting period.

The heart of the system is the double entry journal subroutine.

The "balance sheet" routine will ask for a beginning inventory and a closing inventory. If your business does not have an inventory, just press "ENTER" in response to those questions and it will pass them. Those entries, however, when made *do not* become part of the journal tape.

The program is written for the small cash-basis business. However, it does provide "accounts receivable" and "accounts payable" accounts to accommodate those businesses which are basically cash-basis but involve a bonus which is receivable and/or payable at some time following the close of the accounting period, or for those businesses which borrowed money to get started.

```
ASSETS FOR  81001 THRU  81031
ACCOUNT                DEBIT        CREDIT
CASH                $2785.00         $0.00
INVENTORY           $1200.00         $0.00
SUPPLIES               $0.00         $0.00
EQUIPMENT            $500.00         $0.00
ACCTS RECVABL          $0.00         $0.00
  TOTAL              $4485.00         $0.00

LIABILITIES FROM  81001  THRU  81031
ACCOUNT                DEBIT        CREDIT
ACCTS PAYBL            $0.00         $0.00
  TOTAL                $0.00         $0.00

PROPRIETOR FROM  81001  THRU  81031
ACCOUNT                DEBIT        CREDIT
CAPITAL                $0.00      $4000.00
DRAWING                $0.00         $0.00
  TOTAL                $0.00      $4000.00

INCOME FROM  81001  THRU  81031
ACCOUNT                DEBIT        CREDIT
WHOLESALE              $0.00       $252.00
RETAIL                 $0.00       $245.00
BONUSES                $0.00         $0.00
  TOTAL                $0.00       $497.00


EXPENSES FROM  81001  THRU  81031
ACCOUNT                DEBIT        CREDIT
SUPPLIES EX            $0.00         $0.00
TRANSPORT EX           $0.00         $0.00
ADVERTISING           $12.00         $0.00
MISC EX                $0.00         $0.00
EQUIP EX               $0.00         $0.00
DISTRIB BON            $0.00         $0.00
  TOTAL               $12.00         $0.00
```

Figure 2. Sample output from balance sheet subroutine.

To reduce the number of data tapes which might be tied up with accounting transactions over a period of time, a tape consolidation routine is included. This routine runs independently of the main accounting program. It will accept up to 50 entries at one time and output them to a fresh tape or to the end of an existing tape. This routine is designed to operate comfortably in 16K. If you want to expand it, just change the DIM and CLEAR statements to suit your situation.

Both programs are written in double precision. If none of your accounts totals $10,000 or more for your accounting period, you may speed the programs significantly by converting them to single precision. This is done by loading the program and entering the statement number "40" before entering "RUN."

If the accounts used in the program do not include all of those required and do include some not needed, a substitution on a one-for-one basis is called for. This is a simple matter so long as the account numbers are not changed, or a substitution of one type of account for another type of account is not made. For example, a direct substitution of one kind of expense account for another would be proper, but a substitution of a sales account for a needed expense account would not (at least not without changing the computation in the "balance sheet" routine.)

I have used this program for about fourteen months (six months overlap with my manual system) and have found it trouble-free. I would have liked to have had a printer during the whole time, but there are not many figures to copy to develop the balance sheet, so the absence of the printer was not a severe limitation. The only trouble I have had has not been with the program, but with accounting theory—I keep getting my debits and credits mixed up. I have almost cured myself of that habit, since it is a bit cumbersome to correct that type of mistake once it has been added to the journal tape. The simplest means is to offset it with a correcting entry and then reenter the transaction properly. It can be done with the tape consolidation routine, but I do not recommend it.

A final caution is, if you do not understand double-entry accounting you should get a copy of a good college accounting text book. You will find it a good investment.□

Program begins on page 122.

Orange Micro

"THE COMPUTER PRINTER SPECIALISTS"

UP TO 25% DISCOUNTS! — SAME DAY SHIPMENT!

CENTRONICS 737 (RADIO SHACK LINE PRINTER IV)

Word Processing Print Quality

• 18 x 9 dot matrix; suitable for word processing • Underlining • proportional spacing • right margin justification • serif typeface • 50/80 CPS • 9½" Pin Feed/Friction feed • Reverse Platen • 80/132 columns

CENTRONICS 737-1 (Parallel)	(List $995)	**$765**
CENTRONICS 737-3 (Serial)	(List $1045)	**$815**

VISTA — C. ITOH

Daisy Wheel Letter Quality

• 25 CPS (Optional 45 CPS) • Typewriter quality • Centronics parallel • RS 232 Serial (Optional) • Proportional spacing • Bidirectional • Programmable VFU • Self test • Diablo compatible • Friction feed (Optional tractors) • 136 printable columns. • Manufactured by C. ITOH.

VISTA V300 (C. ITOH)	(List $1895)	**$ Call**

OUR BEST BUY! EPSON MX80/MX70

Low-Priced Professional Print Quality

• 9 x 9 dot matrix • Lower case descenders • 80 CPS • Bidirectional, Logic seeking • 40, 66, 80, 132 columns per line • 64 special graphic characters: TRS-80 Compatible • Forms handling • Multi-pass printing • Adjustable tractors

EPSON MX80	(List $645)	**$Call**
EPSON MX 70 Dot graphics, 5 x 7 matrix	(List $450)	**$Call**

ANACOM

Low Cost, High Speed, Wide Carriage

• 9 x 9 dot matrix • Lower case descenders • Wide carriage • Adjustable tractors to 16" • 150 CPS, Bidirectional, Logic Seeking

ANACOM 150	(List $1350)	**$ Call**

ANADEX

Dot Graphics, Wide Carriage

• 11 x 9 dot matrix; lower case descenders • Dot resolution graphics • Bi-directional, logic seeking • Up to 200 CPS • RS 232 Serial & Parallel • Forms control • X-ON/X-OFF • Up to 6 part copy.

ANADEX 9501	(List $1650)	**$1350**

OKIDATA MICROLINE SERIES

TRS-80 Graphics Compatibility, Friction Feed

• 9 x 7 dot matrix • 80 CPS • 80, 132 columns — 64 shapes for charts, graphs & diagrams • Double wide characters • 6/8 lines per inch • Up to 3 part copy • Friction & pin feed • 200 M character head warranty

OKIDATA MICROLINE 80	(List $800)	**$520**
OKIDATA M82 Bidirectional, Forms handling	(List $960)	**$750**
OKIDATA M83 Wide carriage, 9 x 9 dot matrix	(List $1260)	**$1050**

NEC SPINWRITER

High Speed Letter Quality

• 55 CPS • Typewriter quality • Bidirectional • Plotting • proportional spacing.

5510-5 RO, Serial, w/tractors	(List $2995)	**$2625**
5530-5 RO, Parallel, w/tractors	(List $2970)	**$2599**

TELEVIDEO CRT'S

AT DISCOUNT PRICES!

TVI 912C
TVI 920C
TVI 950

Please Call Toll Free
Prices are too low to advertise

QUANTITY PRICING AVAILABLE

IDS PAPER TIGERS

Dot Resolution Graphics, quality print, speed

• 7 wire printhead (445); 9 wire printhead (460) with lower case descenders • Over 150 CPS • bi-directional, logic seeking (460) • 8 character sizes; 80-132 columns • Adjustable tractors • High-resolution dot graphics • Proportional spacing & text justification (460).

IDS 445G 7 wire printhead, graphics	(List $895)	**$ 750**
IDS 460G 9 wire printhead, graphics	(List $1394)	**$1150**
IDS 560G 9 wire, wide carriage, graphics	(List $1794)	**$1590**

PRINTERS

MALIBU 165 wide carriage, graphics, letter quality	(List $2495)	**$ 1975**
QUME 5/45 typewriter quality	(List $2905)	**$ 2559**

INTERFACE EQUIPMENT

CCS APPLE PARALLEL interface & cable		**$ 150**
APPLE II - EPSON MX80 parallel interface board & cable		**$ 100**
SSM AIO BOARD Apple Serial/parallel interface	(List $225)	**$ 175**
MICROTRONICS Atari parallel interface		**$ 69**
ATARI 850 interface module, serial/parallel		**$ 199**
TRS-80 CABLES to keyboard or Exp. Interface		**$ Call**
NOVATION D-CAT direct connect modem		**$ Call**

CALL FOR FREE CATALOG

(800) 854-8275

CA, AK, HI (714) 630-3322

At Orange Micro, we try to fit the right printer to your application. Call our printer specialists for free consultation.

TELEPHONE ORDERS: Mon.-Fri. 8:30 - 5:00
The Orange Micro Printer Store (Retail):
Mon.-Fri. 10:00 - 6:00, Sat. till 4:00

Phone orders WELCOME; same day shipment. Free use of VISA & MASTERCARD. Personal checks require 2 weeks to clear. Manufacturer's warranty included on all equipment. Prices subject to revision.

Orange Micro, Inc.
3150 E. La Palma, Suite I
Anaheim, CA 92806

CIRCLE 250 ON READER SERVICE CARD

SPECTACULAR OFFERS

BASF "FLEXYDISK"
Superior Quality data storage medium.
Certified and guaranteed 100% error free.

SINGLE SIDED-SINGLE DENSITY

5¼" or 8" Diskettes ..... 10/$24
5¼" or 8" Vinyl Storage Pages ..... 10/$5

MAXELL-DISKETTES
The best quality diskette money can buy.
Approved by Shugart and IBM.
Sold only in boxes of 10

5", 1 side	$3.30
8", 1-side	$3.90
5", 2-side	$4.25
8", 2-side	$5.60

ALL MAXELL DISKETTES ARE DOUBLE DENSITY

LIBRARY CASE...
3-ring binder album. Protects your valuable programs on disks
Fully enclosed and protected on all sides.
Similar to Kas-sette storage box.

Library 3-Ring Binder	$6.50
5¼" Mini Kas−sette/10	$2.49
8" Kas-sette/10	$2.99

DISKETTE DRIVE HEAD CLEANING KITS
Prevent head crashes and insure efficient, error-free operation.

5¼" or 8" $19.50

SFD CASSETTES
C-10 Cassettes ..... 10/$7
(All cassettes include box & labels)
Get 8 cassettes C-10 sonic and Cassette/8 library album for only $8.00
(As illustrated)

HARDHOLE
Reinforcing ring of tough mylar protects disk from damage
8" Applicator $4 5¼" Applicator $3
50/8" Hardholes $8 5¼" Hardholes $6

VISA • MASTERCHARGE • MONEY ORDERS
CERTIFIED CHECK • FOR PERSONAL CHECKS ALLOW TWO WEEKS • C.O.D. REQUIRES A 10% DEPOSIT • CAL. RES. ADD 6% SALES TAX
MIN $2 SHIPPING & HANDLING • MINIMUM ORDER $10 • SATISFACTION GUARANTEED OR FULL REFUND
Write for our free catalog.

ABM PRODUCTS

631 B ST.
SAN DIEGO, CA 92101
(714)235-6602

CIRCLE 103 ON READER SERVICE CARD

Program Listing

```
10 'PROGRAMMED BY C.A. JOHNSON,PO BOX 5876,SAN ANTONIO,TX 78201
20 CLS
30 CLEAR 1000
40 DEFDBL B,C,D,P
50 A$="$$######.##":B$="######  %                    ###    ######.##
 ######.##"
60 C$="ACCOUNT                    DEBIT      CREDIT"
70 DEFINT A-Z:DIM JD(15),D$(15),AC(15),DR(15),CR(15)
80 PRINT"* * *  ACCOUNTING SYSTEM FOR AMWAY DISTRIBUTORS * * *":PRINT
90 PRINT"THE SYSTEM CONSISTS OF SEVERAL MODULES.  THE JOURNAL KEEPS
THE DETAILED  RECORDS.  THE OTHER  MODULES  EITHER  COMPUTE NEEDED
VALUES,  PRODUCE  REPORTS  FOR  MANAGEMENT  OR  TAX-
100 PRINT"PURPOSES, OR PERFORM UTILITY FUNCTIONS. IT IS A DOUBLE
ENTRY  SYSTEM,  REQUIRING AT LEAST TWO ENTRIES PER TRANSACTION.
FOR EACH TRANSACTION,  DEBITS AND CREDITS MUST EQUAL  OR THE SYSTEM
WILL NOT TRANSMIT THE DATA TO TAPE."
110 PRINT:PRINT"IF YOU ARE UNFAMILIAR WITH DOUBLE ENTRY ACCOUNTING,
REFER  TO A COLLEGE ACCOUNTING TEXT.":PRINT:INPUT"PRESS ENTER TO
CONTINUE";T$:PRINT
120 CLS:PRINT"THE ACCOUNT STRUCTURE IS:":PRINT:PRINT"1.
ASSETS":PRINT"  11. CASH":PRINT"  12. INVENTORY":PRINT"  13.
SUPPLIES":PRINT"  14. EQUIPMENT":PRINT"  15. ACCOUNTS
RECEIVABLE":PRINT
130 PRINT"2. LIABILITIES":PRINT"  21. ACCOUNTS
PAYABLE":PRINT:PRINT"3.PROPRIETORSHIP":PRINT"  31. CAPITAL":PRINT"
32. DRAWINC":INPUT"PRESS ENTER TO CONTINUE";T$
140 CLS:PRINT"4. INCOME":PRINT"  41. WHOLESALE SALES":PRINT"  42.
RETAIL SALES":PRINT"  43. BONUSES":PRINT:PRINT"5. EXPENSES":PRINT"
51. SUPPLIES EXPENSE"
150 PRINT"  52. TRANSPORTATION EXPENSE":PRINT"  53. ADVERTISING
EXPENSE":PRINT"  54. MISCELLANEOUS EXPENSE":PRINT"  55. EQUIPMENT
EXPENSE":PRINT"  56. DISTRIBUTOR BONUSES":PRINT
160 PRINT:INPUT"PRESS ENTER FOR THE MENU AND SELECT THE MODULE
WANTED.";T$
170 CLS:PRINT"THE FOLLOWING MODULES ARE AVAILABLE:":PRINT
180 PRINT"1.  JOURNAL ENTRY.":PRINT"2.  COMPUTE BALANCE
SHEET.":PRINT"3.  JOURNAL DATA TAPE CONSOLIDATION.":INPUT"ENTER
MODULE WANTED ";N
190 ON N GOSUB 210  ,  630  ,  1470
200 CLS:GOTO 170
210 CLS:PRINT"* * *  JOURNAL MODULE  * * *":PRINT
220 PRINT"JULIAN DATE IS ENTERED IN YYDDD FORMAT. IF TRANSACTION
ENTERED BALANCES,  THE PROGRAM TRANSMITS THE DATA TO TAPE.  IF YOU
MAKE A MISTAKE IN DATA ENTRY, ENTER 'O' FOR JULIAN DATE AND RE-ENTER"
230 PRINT"ENTIRE TRANSACTION.  AFTER ENTERING LAST TRANSACTION,
MAKE  ONE ADDITIONAL  ENTRY  OF  VALID  JULIAN DATE.  'LAST ENTRY' IN
DESCRIPTION,  AND 'O' IN OTHER FIELDS.  DESCRIPTIONS SHOULD BE
LIMITED TO FIFTEEN(15) CHARACTERS."
240 PRINT:INPUT"PREPARE RECORDER TO RECORD DATA.  PRESS ENTER WHEN
READY";T$:CLS
250 FOR I=1TO10
260 INPUT "ENTER JULIAN DATE ";JD(I)
270 IF JD(I)=0 THEN 410  : 'ALLOWS CORRECTION OF KEYING ERROR
280 INPUT "ENTER BRIEF DESCRIPTOR ";D$(I)
290 INPUT "ENTER ACCOUNT NUMBER ";AC(I)
300 INPUT "ENTER DEBIT ";DR(I)
310 INPUT "ENTER CREDIT ";CR(I)
320 D1=D1+DR(I):C1=C1+CR(I)
330 IF C1=D1 THEN 350
340 NEXT I
350 INPUT "TRANSACTION BALANCES. ANOTHER TRANSACTION (Y/N)";T$
360 FOR J=1TOI
370 PRINT#-1, JD(J),D$(J),AC(J),DR(J),CR(J)
380 NEXT J
390 IF T$="Y" GOTO 250
400 RETURN
410 C1=0:D1=0:GOTO 250
420 RETURN
630 CLS:PRINT"* * *  BALANCE SHEET MODULE  * * *":PRINT:PRINT
633 INPUT"DO YOU WANT JOURNAL ENTRIES OUTPUT TO PRINTER(Y/N)";PT$
635 PRINT:PRINT:INPUT"DO YOU WANT BALANCE SHEET OUTPUT TO
PRINTER(Y/N)";PR$:PRINT:PRINT
640 INPUT"INPUT RANGE OF TIME PERIOD FOR BALANCE SHEET
DESIRED(DATE,DATE)";JB,JE
650 PRINT"OPENING AND CLOSING INVENTORIES ARE REQUIRED TO BE"
660 PRINT"MEANINGFUL.":INPUT"INPUT BECINNING INVENTORY VALUE";DX
670 INPUT"INPUT ENDING INVENTORY VALUE";DY
680 D2=DX-DY:PRINT:PRINT
690 INPUT"PREPARE TO READ DATA TAPE  PRESS ENTER WHEN
READY.";T$:CLS:PRINT"* ONE MOMENT,PLEASE *":PRINT:PRINT
700 INPUT#-1, JD,D$,AC,DR,CR
710 IF D$ "LAST ENTRY" THEN 1100
720 IF JD<JB THEN 700
730 IF JD>JE THEN 700
740 IF AC<11 GOTO 910
750 IF AC<12 GOTO 920
760 IF AC<13 GOTO 930
770 IF AC<14 GOTO 940
780 IF AC<15 GOTO 950
```

```
790 IF AC=21 GOTO 960
800 IF AC=31 GOTO 970
810 IF AC=32 GOTO 980
820 IF AC=41 GOTO 990
830 IF AC=42 GOTO 1000
840 IF AC=43 THEN 1010
850 IF AC=51 THEN 1020
860 IF AC=52 THEN 1030
870 IF AC=53 THEN 1040
880 IF AC=54 THEN 1050
890 IF AC=55 THEN 1060
900 IF AC=56 THEN 1070
910 D1=D1+DR:C1=C1+CR:GOTO 1080
920 D2=D2+DR:C2=C2+CR:GOTO 1080
930 D3=D3+DR:C3=C3+CR:GOTO 1080
940 D4=D4+DR:C4=C4+CR:GOTO 1080
950 D5=D5+DR:C5=C5+CR:GOTO 1080
960 D6=D6+DR:C6=C6+CR:GOTO 1080
970 D7=D7+DR:C7=C7+CR:GOTO 1080
980 D8=D8+DR:C8=C8+CR:GOTO 1080
990 DA=DA+DR:CA=CA+CR:GOTO 1080
1000 DB=DB+DR:CB=CB+CR:GOTO 1080
1010 DC=DC+DR:CC=CC+CR:GOTO 1080
1020 DD=DD+DR:CD=CD+CR:GOTO 1080
1030 DE=DE+DR:CE=CE+CR:GOTO 1080
1040 DF=DF+DR:CF=CF+CR:GOTO 1080
1050 DG=DG+DR:CG=CG+CR:GOTO 1080
1060 DH=DH+DR:CH=CH+CR:GOTO 1080
1070 DI=DI+DR:CI=CI+CR:GOTO 1080
1080 PRINT USING B$;JD,D$,AC,DR,CR
1085 IF PT$="Y"THEN LPRINT USING B$;JD,D$,AC,DR,CR
1090 GOTO 700
1100 PRINT:INPUT"LAST ENTRY SENSED. DO YOU HAVE MORE DATA(Y/N)";T$
1110 IF T$="Y" THEN INPUT"PREPARE RECORDER. PRESS ENTER WHEN
READY";T$:GOTO 700
1120 INPUT"PRESS ENTER FOR BALANCE SHEET";T$:CLS
1130 PRINT:PRINT "ASSETS FOR";JB;"THRU";JE:PRINT C$
1135 IF PR$ ="Y"THEN LPRINT:LPRINT "ASSETS FOR ";JB;"THRU
";JE:LPRINTC$
1140 PRINT "CASH",,:D1-DI-C1:C1-CI-O:PRINT USING A$;D1,C1
1145 IF PR$ ="Y" THEN LPRINT "CASH",,:LPRINT USINGA$;D1,C1
1150 PRINT"INVENTORY",,:D2-C2+C2-O:PRINT USING A$;D2,C2
1155 IF PR$ "Y" THEN LPRINT "INVENTORY",,:LPRINT USING A$;D2,C2
1160 PRINT"SUPPLIES",,:D3-D3-C3:C3-O:PRINT USING A$;D3,C3
1165 IF PR$ "Y" THEN LPRINT"SUPPLIES",,:LPRINT USING A$;D3,C3
1170 PRINT"EQUIPMENT",,:D4-C4:C4-O:PRINT USING A$;D4,C4
1175 IF PR$ "Y" THEN LPRINT "EQUIPMENT",,:LPRINT USING A$;D4,C4
1180 PRINT"ACCTS RECVABL",,:D5 D5-C5:C5 O:PRINT USING A$;D5,C5
1185 IF PR$ "Y" THEN LPRINT"ACCTS RECVABL",,:LPRINT USING A$;D5,C5
1190 PRINT" TOTAL",,:DJ-D1+D2+D3+D4+D5:CJ-O:PRINT USING A$;DJ,CJ
1195 IF PR$-"Y" THEN LPRINT" TOTAL",,:LPRINT USING A$;DJ,CJ
1200 PRINT:PRINT"LIABILITIES FROM";JB;"THRU";JE:PRINT C$
1205 IF PR$ "Y" THEN LPRINT:LPRINT"LIABILITIES FROM ";JB;" THRU
";JE:LPRINT C$
1210 PRINT"ACCTS PAYBL",,:C6 D6:D6 O:PRINT USING A$;D6,C6
1215 IF PR$ "Y" THEN LPRINT"ACCTS PAYBL",,:LPRINT USING A$;D6,C6
1220 PRINT" TOTAL",,:PRINT USING A$;D6,C6
1225 IF PR$ "Y"THEN LPRINT" TOTAL",,:LPRINT USING A$;D6,C6
1230 PR:INPUT"PRESS ENTER TO CONTINUE";T$:CLS:IF PR$ "Y"
THENLPRINT
1240 PRINT"PROPRIETOR FROM";JB;"THRI";JE:PRINT C$
1245 IF PR$ "Y"THEN LPRINT"PROPRIETOR FROM ";JB;" THRU ";JE:LPRINT C$
1250 PRINT"CAPITAL",,:C7 C7-D7:D7 O:PRINT USING A$;D7,C7
1255 IF PR$"Y" THEN LPRINT"CAPITAL",,:LPRINT USING A$;D7,C7
1260 PRINT"DRAWING",,:PRINT USING A$;D8,C8
1265 IF PR$-"Y"THEN LPRINT"DRAWING",,:LPRINT USING A$;D8,C8
1270 PRINT" TOTAL",,:DL D7-D8:CL C7-C8:PRINT USING A$;DL,CL
1275 IF PR$ "Y"THEN LPRINT" TOTAL",,:LPRINT USING A$;DL,CL
1280 PRINT:PRINT"INCOME FROM";JB;"THRU";JE:PRINT C$
1285 IF PR$-"Y"THEN LPRINT:LPRINT"INCOME FROM ";JB;" THRU ";JE:LPRINT
C$
1290 PRINT"WHOLESALE",,:PRINT USING A$;DA,CA
1295 IF PR$ "Y"THEN LPRINT"WHOLESALE",,:LPRINT USING A$;DA,CA
1300 PRINT"RETAIL",,:PRINT USING A$;DB,CB
1305 IF PR$ "Y"THEN LPRINT"RETAIL",,:LPRINT USING A$;DB,CB
1310 PRINT"BONUSES",,:PRINT USING A$;DC,CC
1315 IF PR$ "Y"THEN LPRINT"BONUSES",,:LPRINT USING A$;DC,CC
1320 PRINT" TOTAL",,:DM DA+DB-DC:CM-CA+CB-CC:PRINT USING A$;DM,CM
1325 IF PR$ "Y"THEN LPRINT" TOTAL",,:LPRINT USING A$;DM,CM
1330 PRINT:INPUT"PRESS ENTER TO CONTINUE";T$:CLS:IF PR$-"Y"THENLPRINT
1340 PRINT:PRINT"EXPENSES FROM";JB;"THRU";JE:PRINT C$
1345 IF PR$-"Y"THEN LPRINT:LPRINT"EXPENSES FROM ";JB;" THRU
";JE:LPRINT C$
1350 PRINT"SUPPLIES EX",,:PRINT USING A$;DD,CD
1355 IF PR$-"Y"THEN LPRINT"SUPPLIES EX",,:LPRINT USING A$;DD,CD
1360 PRINT"TRANSPORT EX",,:PRINT USING A$;DE,CE
1365 IF PR$ "Y"THEN LPRINT"TRANSPORT EX",,:LPRINT USING A$;DE,CE
1370 PRINT"ADVERTISING",,:PRINT USING A$:DF,CF
1375 IF PR$-"Y"THEN LPRINT"ADVERTISING",,:LPRINT USING A$:DF,CF
```


STRICKLY apple®

APPLE II PLUS:	YOU SAVE
16K	$1049 22%
48K	$1099 29%
64K	$1269 27%
Apple ///	Call

All are 1981 model with Apple RAM, 64K unit is 48K unit with Microsoft 16K RAM board.

IMPORTANT NOTE: We will repair all Apple equipment regardless of where you purchased it.

Disk II & 3.3 Controler	$ 499	23%
Disk II	$ 439	16%
Moniters, Sanyo 9" B&W	$ 169	30%
12" B&W	$ 249	21%
12" Grn.	$ 299	21%
13" Color	$ 449	20%
RF Modulator, M&R	$ 25	38%
Silentype printer	$ 499	22%
Qume Sprint 5 45RO	$2499	20%
Serial Interface Card	$ 129	35%
Apple Writer program	$ 59	21%
Visicalc	$ 119	21%
80 Column Video:		
Apple Smarterm	$ 299	17%
M&R, SuperTerm	$ 319	14%
Videx, Videoterm	$ 249	18%
Language/Pascal Sys.	$ 379	24%
Apple Plot	$ 55	21%
Microsoft:		
Z80 Softcard	$ 250	28%
16K RAM Card	$ 169	18%
Epson MX 80	$ 475	27%
" **Interface & cable**	$ 95	15%
" **MX70**	Call	Call
DC Hayes Micromodem	$ 299	23%
16K Expansion RAM Kit	$ 39	74%
10 Memorex 5" disks	$ 25	45%
10 Maxwell 5" disks	$ 39	33%

Accounting Sofware

"Insoft Account" $ 385 86%

(a full professional quality intergrated GL,A/R,A/P, Payroll package with hotline support). Send for free sempls printouts.

Above prices for mail orders only. Mail Order Dept. located in Jacksonville, OR. Our store showroom is at 126 NE F St., Grants Pass, OR. Store prices include service and will differ. No mail order sales at store. CALL ORDER DESK.

(800) 547-1289

TECHNICAL & OREGON:

(503) 899-7297

ORDERING INFORMATION: Minimum order $100. Money Orders, Cashier Checks or Bank Wire Welcomed. Visa and MC orders add 3%. Personal checks accepted (allow up to **20 days** to clear). All orders add 3% for shipping, handling and insurance. Include your telephone number. No COD's. Prices subject to change without notice. Order desk hours are 9 to 6 PST, 10 to 3 Saturdays.

Computer Exchange

THE MAIL ORDER DEPARTMENT OF

THE MICRO COMPUTER STORE

P O BOX 1380

Jacksonville, OR 97530

CIRCLE 141 ON READER SERVICE CARD

meet a
REAL
PLUS

Color Computer 4K $310

Model II 64K
$3375

Atari 800 16K $789

Model III 16K
$859

These are just a few of our many fine offers — computers, peripherals, modems, printers, disc drives and an unusual selection of package values. Call TOLL FREE today and check us out for price and warranty.

Pure Radio Shack equipment warranteed at any Radio Shack store or dealer. Factory warrantees on Apple and Atari equipment. Other equipment carries manufacturer's warranty or Computer Plus 180 day extended warranty. Combined warrantees carry Computer Plus 180 day warranty or original manufacturer's warranty

DEALER INQUIRIES ARE INVITED
Prices subject to change without notice
TRS-80 is a registered trademark of Tandy Corp.

call TOLL FREE
1-800-343-8124

computer plus

Write for your free catalog

Dept. F
245A Great Road
Littleton, MA 01460

(617) 486-3193

CIRCLE 123 ON READER SERVICE CARD


```
1380 PRINT"MISC EX",:PRINT USING A$;DG,CG
1385 IF PR$="Y"THEN LPRINT"MISC EX",:LPRINT USING A$;DG,CG
1390 PRINT"EQUIP EX",:PRINT USING A$;DH,CH
1395 IF PR$="Y"THEN LPRINT"EQUIP EX",:LPRINT USING A$;DH,CH
1400 PRINT"DISTRIB BON",:PRINT USING A$;DI,CI
1405 IF PR$="Y"THEN LPRINT"DISTRIB BON",:LPRINT USING A$;DI,CI
1410 PRINT"  TOTAL",:;DN=DD+DE+DF+DG+DH+DI:CN=CD+CE+CF+CG+CH+CI:PRINT
USING A$;DN,CN
1415 IF PR$="Y"THEN LPRINT"  TOTAL",:LPRINT USING A$;DN,CN
1420 PRINT:PRINT:INPUT"END OF BALANCE SHEET. PRESS ENTER FOR
MENU";T$:RETURN
1470 CLS:PRINT"* * * JOURNAL DATA TAPE CONSOLIDATION MODULE * * *"
1480 PRINT:PRINT"  THIS MODULE WILL CONSOLIDATE THE DATA ENTRIES
FROM SEVERALJOURNAL DATA TAPES INTO A SINGLE JOURNAL DATA TAPE.  IN
ORDER TO HANDLE A FAIRLY LARGE NUMBER OF TRANSACTIONS, AND SINCE THE"
1490 PRINT"FEATURES OF THE MAIN PROGRAM ARE NOT NEEDED FOR THIS
PURPOSE, ITIS INCLUDED AS AN UTILITY ROUTINE ON YOUR PROCRAM TAPE.
PREPAREYOUR RECORDER TO READ YOUR PROCRAM TAPE.  PRESS 'BREAK' AND
LOAD PROGRAM B."
1500 PRINT:INPUT"PRESS ENTER TO RETURN TO MENU";T$:RETURN
```

Journal Tape Consolidation Program

```
10 CLS:PRINT"* * * JOURNAL TAPE CONSOLIDATION PROCRAM * * *":PRINT
20 CLEAR 3000
30 B$="######  ";                  ";  ###  ######.##  ######.##"
40 DEFDBL C,D
50 DEFINT A,I,K
60 DIM JD(50),D$(50),AC(50),DR(50),CR(50)
70 PRINT:PRINT" BEFORE  RUNNING  THIS ROUTINE, YOU SHOULD HAVE A TAPE
PREPARED WITH THE JOURNAL MODULE, CONTAINING ANY LEGAL JULIAN DATE.
'LAST ENTRY' IN THE BRIEF DESCRIPTOR FIELD, AND '0' IN EACH OF THE"
80 PRINT"OTHER THREE FIELDS TO STOP INPUT IF NEEDED.":PRINT
90 PRINT:PRINT"  THIS MODULE WILL CONSOLIDATE THE DATA  ENTRIES  FROM
 SEVERAL JOURNAL DATA TAPES INTO A SINGLE JOURNAL DATA
TAPE.":PRINT:INPUT"  PRESS ENTER TO CONTINUE";T$:CLS
100 PRINT:PRINT:PRINT"  THE AMOUNT OF DATA YOU CONSOLIDATE ONTO A
SINGLE CASSETTE WILLDEPEND  UPON SEVERAL  FACTORS,  MOST OF WHICH YOU
WILL DISCOVER FROM EXPERIENCE.  HOWEVER, CONSIDER THESE FACTORS
BEFORE YOU "
110 PRINT"MAKE UP YOUR MIND.  TOO MUCH DATA ON A SINGLE CASSETTE
REQUIRES EXCESSIVE AMOUNTS OF DATA INPUT TIME.  TOO LITTLE DATA ON
EACH CASSETTE WILL TIE UP TOO MANY CASSETTES.  IF YOU ARE NEW IN THE
BUSINESS YOU MAY WANT TO KEEP THREE OR";
120 PRINT" FOUR MONTHS TRANSACTIONS ON A SINGLE CASSETTE.  AS YOUR
BUSINESS GROWS, YOU MAY WANT TO REDUCE THE TIME PERIOD UNTIL YOU WILL
PROBABLY MAINTAIN A CASSETTE FOR EACH MONTH."
130 PRINT:INPUT"PRESS ENTER TO CONTINUE";T$:CLS:PRINT
140 PRINT:PRINT"  FIFTY  ENTRIES WILL FIT ON A SINGLE SIDE OF A C10
TAPE WITH A FAIR MARGIN FOR VARIATION IN THE LENCTH OF THE
DISCRIPTION.  IF THE  CONSOLIDATION  ROUTINE  STOPS  IN THE MIDDLE OF
YOUR INPUT TAPE, REMOVE IT WITHOUT REWINDING.  WHEN YOU'L
150 PRINT" REPLACE IT IN THE RECORDER TO CONTINUE YOUR CONSOLIDATION.
BE SURE YOU REPLACE IT AS IT WAS."
160 PRINT:INPUT"  PRESS ENTER TO CONTINUE";T$:CLS
170 CLS:PRINT:PRINT" AS THE DATA IS READ FROM TAPE ,  IT WILL BE
DISPLAYED ON THE SCREEN SO THAT YOU MAY AUDIT WHAT IS BEING
READ.":PRINT
173 INPUT"DO YOU WANT OUTPUT TO PRINTER (Y/N) ";PR$
180 INPUT"PREPARE RECORDER TO READ FIRST TAPE.  PRESS ENTER WHEN
READY";T$
190 CLS:PRINT""  ONE MOMENT PLEASE  ""
200 FOR I=1TO50
210 INPUT#-1,JD(I),D$(I),AC(I),DR(I),CR(I)
220 IF D$(I)="LAST ENTRY" THEN 250
225 IF PR$  "Y" THEN LPRINT USING B$;JD(I),D$(I),AC(I),DR(I),CR(I)
230 PRINT USING B$;JD(I),D$(I),AC(I),DR(I),CR(I)
240 NEXT I:PRINT"INPUT LIMIT REACHED.":GOTO 270
250 INPUT"LAST ENTRY SENSED.  DO YOU HAVE MORE DATA (Y/N)";T$
260 IF T$="Y" THEN INPUT"PREPARE RECORDER TO READ NEXT TAPE. PRESS
ENTER WHEN READY";T$:GOTO 210
270 I=I-1:INPUT"PREPARE RECORDER TO RECORD DATA.  PRESS ENTER WHEN
READY.";T$
280 FOR J=1TOI
290 PRINT#-1,JD(J),D$(J),AC(J),DR(J),CR(J)
300 NEXT J
310 JD=80000:D$="LAST ENTRY":AC=0:DR=0:CR=0:PRINT#-1,JD,D$,AC,DR,CR
320 PRINT"YOU HAVE CONSOLIDATED  ";J-1;"  ENTRIES ON THIS TAPE."
330 PRINT:INPUT"DO YOU HAVE MORE DATA TO CONSOLIDATE(Y/N)";T$
340 IF T$="N" THEN STOP
350 PRINT:PRINT"  IF THE  CONSOLIDATION  RUN  STOPPED  IN THE MIDDLE
OF A TAPE, REMOUNT THE TAPE WHERE IT STOPPED.  OTHERWISE, MOUNT NEXT
DATA TAPE AND PREPARE THE RECORDER TO READ."
360 PRINT:INPUT"PRESS ENTER WHEN READY";T$:GOTO 190
```

THEY ALL LOOK THE SAME WITH THEIR CLOTHES OFF.

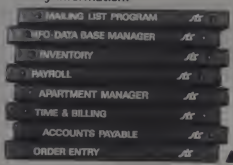
The difference lies with the software.

The difference between one computer's performance and another's lies with the software.

We think we have the best Apple™ software there is for business. A complete line of packages for data base management, mailing lists, order entry, inventory, accounts payable, payroll, billing and apartment management.

So what makes us so different? For one thing, STC programs are proven, accepted and in operation throughout the world. Secondly, we offer an extremely unusual 90-day guarantee. Third, you can learn to run STC programs in about half an hour, compared to 5 or 6 days with other packages. And last, STC programmers have many years of experience developing business systems for much larger computers. As a result, we design packages that exploit every ounce of power the Apple has to give.

Take our inventory program, for example. It provides for all kinds of inventory information.



You can generate numerous reports, calculate inventory value, and accumulate inventory over a 13-month period. All for only $140.

All STC packages are designed for DOS 3.3 and will run on the Apple III in the emulated mode.

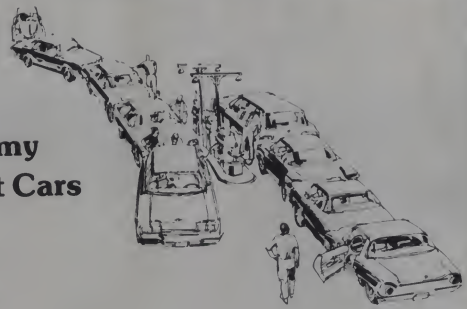
So check out STC business packages with your local Apple dealer today. For dealer information or inquiries, write or call Software Technology for Computers: (617)923-4334. In Europe: Great Northern Ltd., Horsforth, Leeds, England.

SOFTWARE TECHNOLOGY FOR COMPUTERS
P.O. Box 428
Belmont, Ma. 02178

Apple is a trademark of Apple Computer Company

CIRCLE 210 ON READER SERVICE CARD

The Fuel Economy of Two Different Cars



Robert DuFon

This is a short program for comparing the fuel economy of two different cars. It was set up on an Exidy Sorcerer and hardcopied on an Integral Data Systems 440 "Paper Tiger." The program is meant primarily to find out what savings there will be in gasoline costs as the miles-per-gallon ratio varies. It will also consider a 2-year depreciation difference, so that one can weigh the cost factor as well if deciding between the purchase of two different cars.

If the program is to be run on a printer, it may be well to take out lines 0 and 6, since they produce a top-of-form movement of the paper. □

Robert DuFon, 4114 Northcote Ave., East Chicago, IN 46312.

```
LIST

0 PRINT CHR$(12)
1 PRINT "THIS IS A PROGRAM FOR COMPARING THE DEPRECIATION"
2 PRINT "AND OPERATING COSTS BETWEEN TWO AUTOMOBILES."
3 PRINT "ENTER THE MOST EXPENSIVE CAR FIRST BUT IF PRICES"
4 PRINT "ARE CLOSE THEN ENTER THE 'GAS GUZZLER' FIRST."
5 PRINT:INPUT "WHEN READY, PRESS RETURN";X$
6 PRINT CHR$(12)
8 PRINT "INPUT DATA ON CAR A:":PRINT
10 INPUT "NO. OF MILES DRIVEN PER YR. ";M
20 INPUT "NO. OF MILES PER GALLON (CITY) ";C
30 INPUT "NO. OF MILES PER GALLON (HWY) ";H
40 INPUT "% OF TOTAL MILES FOR CITY DRIVING ";P
50 INPUT "COST OF CAR WANTED ";X
60 T=((C*P)+(H*(100-P)))/100
70 G=M/T
80 INPUT "PRICE OF FUEL PER GAL. ";F
90 Y=G*F
95 INPUT "EST. VALUE OF CAR AFTER 2 YRS. ";Z
96 L=X-Z
97 PRINT:PRINT:PRINT
98 IF N=0 THEN PRINT "DATA ON FIRST CAR:":PRINT
99 IF N=1 THEN PRINT "DATA ON SECOND CAR:":PRINT
100 PRINT "COST OF FUEL PER YEAR ";Y
105 PRINT "COST OF FUEL PER MO.(AVG.) ";(Y*82)/24
110 V=((Y*82)+L)/24
120 PRINT "COST OF CAR AND FUEL PER MO. ";V
130 PRINT:PRINT:PRINT
131 N=N+1
132 IF N=2 THEN GOSUB 490
135 J=Y:K=V:A=((Y*82)/24
145 IF N=1 THEN PRINT "INPUT DATA FOR CAR B:":PRINT:GOTO 10
180 END
490 PRINT "ADVANTAGE OF CAR B OVER CAR A:":PRINT
500 PRINT "FUEL SAVINGS PER YEAR ";J-Y
510 PRINT "FUEL SAVINGS PER MO.(AVE) ";A-((Y*82)/24)
520 PRINT "SAVINGS ON CAR AND FUEL PER MO. ";K-V
530 PRINT:PRINT:INPUT"WANT ANOTHER COMPARISON?(Y OR N)";O$
540 IF O$="Y" THEN RUN
550 END
READY
```

```
RUN
THIS IS A PROGRAM FOR COMPARING THE DEPRECIATION
AND OPERATING COSTS BETWEEN TWO AUTOMOBILES.
ENTER THE MOST EXPENSIVE CAR FIRST BUT IF PRICES
ARE CLOSE THEN ENTER THE 'GAS GUZZLER' FIRST.

WHEN READY, PRESS RETURN?
INPUT DATA ON CAR A:

NO. OF MILES DRIVEN PER YR. ? 15000
NO. OF MILES PER GALLON (CITY) ? 16
NO. OF MILES PER GALLON (HWY) ? 21
% OF TOTAL MILES FOR CITY DRIVING ? 85
COST OF CAR WANTED ? 5500
PRICE OF FUEL PER GAL. ? 1.35
EST. VALUE OF CAR AFTER 2 YRS. ? 3500


DATA ON FIRST CAR:

COST OF FUEL PER YEAR  1208.96
COST OF FUEL PER MO.(AVG.)  100.746
COST OF CAR AND FUEL PER MO.  184.08


INPUT DATA FOR CAR B:

NO. OF MILES DRIVEN PER YR. ? 15000
NO. OF MILES PER GALLON (CITY) ? 32
NO. OF MILES PER GALLON (HWY) ? 38
% OF TOTAL MILES FOR CITY DRIVING ? 85
COST OF CAR WANTED ? 4800
PRICE OF FUEL PER GAL. ? 1.35
EST. VALUE OF CAR AFTER 2 YRS. ? 3200


DATA ON SECOND CAR:

COST OF FUEL PER YEAR  615.502
COST OF FUEL PER MO.(AVG.)  51.2918
COST OF CAR AND FUEL PER MO.  117.958


ADVANTAGE OF CAR B OVER CAR A:

FUEL SAVINGS PER YEAR  593.454
FUEL SAVINGS PER MO.(AVE)  49.4545
SAVINGS ON CAR AND FUEL PER MO.  66.1211


WANT ANOTHER COMPARISON?(Y OR N)? N
READY
```

MEMOREX

SUPERB QUALITY AT UNBEATABLE PRICES. THAT'S MEMOREX DISCS FROM PACIFIC EXCHANGES

For Data Reliability—
Memorex
Flexible
Discs

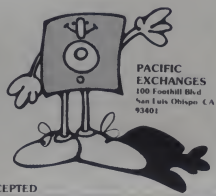
CALL FREE FOR PRICES & INFORMATION

(800)235-4137

In California. (805)543-1037

CIRCLE 216 ON READER SERVICE CARD

DEALER INQUIRIES INVITED VISA C.O.D.'s ACCEPTED



PACIFIC
EXCHANGES
100 Foothill Blvd
San Luis Obispo CA
93401

1 2 3 4 5 6 7 8 9 10 Displaying Numbers in Tabular Format

Melvyn D. Magree

Some Basics do not have a PRINT USING capability. The subroutine described here converts a floating-point number into a string with integer and fractional parts of pre-defined lengths.

Basic prints all numbers with the most significant digit in the leftmost position of the field. If there is a fractional part to the number, all of the digits to represent it completely are displayed. If you wish to display a table, the result may be ragged like this:

```
 1.23
 456.1
 0.75
-90.123
```

But the result that you really want is

```
  1.230
456.100
  0.780
-90.123
```

This latter form is particularly useful when displaying sums of money. Nobody writes a check for 54.3 dollars!

Some Basics do provide a PRINT USING feature, which allows you to give a string which tells Basic how you would like the number displayed. If you have such a Basic, you need read no further. If you do not, a subroutine which handles most cases follows. It is written using Microsoft Basic for the OSI C4P-MF, but it can be used as is for the Apple and many other Basics.

This subroutine rounds the number, separates it into an integer part and a fractional part, places any leading and trailing zeros on the fractional part, converts each part to a string, places any minus sign in front of the integer part, puts the two strings together with a decimal point between them, and pads the resulting string with any required leading spaces.

Melvyn D. Magree, 5925 Magnolia Lane, Plymouth, MN 55442.

Explanation

To understand the subroutine in more detail, let us step through it with an example, say N=123.456, IP=4, and FP=2.

Line 100 saves the sign of N as plus or minus 1 or as 0 if N is 0. Line 102 determines the number to be used for rounding and for ensuring that leading and trailing zeros are in the fractional part. Thus, we have S=1 and N2=100.

Line 104 removes the sign from the number and rounds it to the desired significant figures. Our example is already positive and adding .5/100 to it gives us N1=123.461. If our example had been negative, N1 would have been the same, but the sign would have been saved as S=-1 in line 100.

Lines 106 and 108 separate the rounded, absolute number into an integer part and an augmented fractional part. IP in our case becomes 123. The fractional part is converted to an integer and any leading zeros are preserved. N1-IP is 0.461, multiplying by 100 gives us 46.1, and taking the integer part of that and adding 100 gives us FP=146. The last operation preserves any leading zeros; the extra digit will be removed later.

Line 110 converts the integer part to a string. The STR$ function leaves one position for the sign which we are not interested in at the moment; the last two statements of this line remove this leading space. For our example D$="123" and L=3.

Line 112 is a "fudge" for the case when the integer part is 0 and is not to be displayed. This does not apply for our number. If IP had been zero, D$ from line 110 would have been "0"; if no integer part were to be displayed, D$ should be a null string.

Line 114 places any required minus sign on the string. The second IF statement in the line handles the case where the integer part is zero and only one space had been requested for it. If our number had been negative, we would have had D$="-123" and L=4.

Line 116 is the only error check in the subroutine and is for the most likely error case, a number larger than can be held in the specified fields. Several years ago, I heard of a large scientific computer installation that had changed vendors. When they ran some of the programs they had been using for years, several of the results were given as asterisks rather than as numbers. The second vendor replaced all the numbers that were too big for the given field with asterisks whereas the first vendor truncated the numbers to fit! The installation had been using these truncated numbers as if they were accurate! For our use this problem is not so important, especally if you consider the way that we have constructed the string and the way that we will probably use it. The most probable worst case is that the complete number will be displayed but the line may be extended to the right. I would advise keeping this test so that you are warned about possible errors in your program that give larger results than you expected.

Line 118 places any required spaces in front of the integer part of our number. The technical term for this operation is right-justify and space-fill. D$ for our example is now "123."

Line 120 places the decimal point and the rounded fractional part to the right of the integer part. The STR$ function converts FP to " 146," and the RIGHT$ function gives us the desired "46." The IF statement is included for two reasons. First, Basic considers it an error if you try to extract a substring of length zero and stops your program. Second, if you specified a fractional part of length zero, I presume that you do not want decimal point. D$ is now our desired result of " 123.46." If N had been negative, we would have had "-123.46."

Line 124 processes the error case detected at line 116. DS is set to a string of asterisks. The length of this string is the sum of the requested lengths of the integer and fractional parts plus one for the decimal point.

Display Numbers, continued...

If our number had been 12345.67, then we would have had a result of seven asterisks; that is, D$="*******."

Please note that no error checks are made for specification of negative or unusually large part lengths. Your Basic will probably stop at some point in this subroutine if that does happen.

Although this subroutine is not as fast as it might be if it were provided in ROM or in machine code, it is reasonably fast for many applications. The example was run 100 times on an OSI C4P-MF in 4.5 seconds. This means each execution of the subroutine takes less than 45 milliseconds.

If you do not need the flexibility, you can customize the subroutine and gain some speed. For example, if all of your numbers will be positive, you can delete lines 100 and 114. If you always use a given length fractional part, say 2 for cents, then you can replace line 102 with N2=100. This will probably make the most significant improvement. The above test was run with this last change in 4.15 seconds. □

The Program

Input: N - number to be converted
IL - length for integer part
FL - length for fractional part

Output: D$ - string of length IL+FL+1

Error case: If integer part requires more than IL digits, set D$ to a string of IL+FL+1 asterisks (*).

Uses: S, N1, N2, IP, FP, and L

```
100 S=SGN(N)
102 N2=10 ↑ FL
104 N1=ABS(N)+.5/N2
106 IP=INT(N1)
108 FP=INT(N2*(N1-IP))
110 D$=STR$(IP):L=LEN(D$)-1:D$=RIGHT$(D$,L)
112 IF IL=0 AND IP=0 THEN D$="":L=0
114 IF S<0 THEN L=L+1:D$="-"+D$:IF IP=0 AND FL=1 THEN D$="-":L=1
116 IF IL<L THEN 124
118 IF IL>L THEN D$=" "+D$:L=L+1:GOTO 118
120 IF FL>0 THEN D$=D$+".":RIGHT$(STR$(FP),FL)
122 RETURN
124 D$="*":FOR N1=1 TO IL+FL:D$=D$+"*":NEXT:RETURN
```


TM
dos boss TM
DISK COMMAND EDITOR

DOS BOSS is Beagle Bros new Apple utility package that will let you instantly **rename Apple's DOS Commands** (shorter commands for CATALOG, etc.!) Rename **Error Messages** too (protect programs with 'Not Copyable' message!) More too! Select programs from your catalog with one keystroke! Instantly **customize your catalogs** with your own titles (replace 'Disk Volume' leave or omit the number), catalog by file type or in multiple columns, etc. Included is the **DOS BOSS BOOK**, full of DOS & non-DOS tricks, suggestions & Apple experiments, a great learning tool. PLUS our 11x17 **APPLE COMMAND CHART** of all Basic and DOS Commands PLUS our famous APPLE TIP BOOK of ways to better use your Apple! **All for $24**

We Ship First Class within 24 hours!

$24. ea. Rush **DOS BOSS**, the **DOS BOSS BOOK**, the **APPLE COMMAND CHART**, **TIP BOOK** & **CATALOG**

☐ 5¼" Applesoft disk only. 3.2 unless you specify 3.3

ADD $1.00 for First Class Shipping and Handling.

NAMES= _____ Amt. Enclosed= $_____ (Cal. residents add 6% tax)

ADDRS= _____

CITY$= _____ ZIP=_____

VISA/MASTERCARD include ACCOUNT NO., EXP. DATE & SIGNATURE

VISA

Beagle Bros MICRO SOFTWARE

master charge

Mail to
4315 Sierra Vista Dept. D/ **San Diego, CA 92103**

3 Games*, Tip Book & Command Chart $24

THREE* top-notch Games on one Disk, a super-entertaining 36-page APPLE TIP BOOK, PLUS our famous 11 x 17 APPLE COMMAND CHART displaying all 190 Apple Commands and their functions (**Experiment with new Commands!**). All Shipped directly to your Apple WITHIN 24 HOURS for ONLY $24 + $1 Shipping!

THREE BIG GAMES! **Game #1—WOWZOR.** Our Challenging Changeable Maze Game. Capture targets and block the enemy! Animated clock, musical scoreboard and commands! **GAME #2—ELEVATORS!** Coordinate and control a skyscraper's elevators at rush hour! Color graphics, clock and music too! **GAME #3—QUICK DRAW!** Two full-color gunmen shoot it out on your Apple Screen!

*Order now and receive TWO MORE BONUS GAMES on the same disk! PLUS three full-length ACTION DEMOS of other Beagle Bros games & useful NEW APPLE UTILITY 'DOS BOSS'!

BEAGLE BROS SHIPS ALL DISKS WITHIN 24 HOURS!

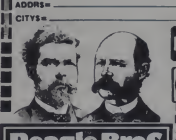
☐ RUSH! **WOWZO, ELEVATORS, QUICK-DRAW,** the 2 **BONUS GAMES,** plus the **APPLE TIP BOOK** and the **APPLE COMMAND CHART**!

PLEASE ADD $1 ($25 total) for Shipping (Cal. res add 6% tax)

NAMES= _____ DOS 3.2 unless you circle: 3.3

ADDRS= _____

CITY$= _____ ZIP=_____



VISA

All 5 Games shipped in BOTH Applesoft AND Integer;

master charge

VISA/MASTERCARD include ACCT NO., EXP. DATE & SIGNATURE.

Mail to:
BEAGLE BROS. Dept. C
4315 *Sierra* Vista,
San Diego, CA 92103
(714) 296-6400.

Beagle Bros MICRO SOFTWARE

CIRCLE 251 ON READER SERVICE CARD

A Cataloguing and Cross-Reference System

CATCARD

Stephen J. Rogowski

Do you own a lot of books? How about slides? Do you have a binder full? Maybe you collect coins. Perhaps you have a lot of articles from various journals which you'd like to catalog and cross-reference.

The System

The CATCARD system presented here is really a very simple method for cataloguing and cross-referencing any kind of material.

It is not an interactive system. That is, it doesn't search for references based upon a number of keys. It is designed to assist in the production of library or reference cards in what is normally a very time consuming operation.

Suppose you decided that you just had too many books to be able to find something quickly. You really have a small library. To be most useful this library should have a card catalog. The prospect of typing all those cards—maybe a dozen per book—is not appealing. But if you could simply enter data for each book once and only once and then have your computer produce the cards you might consider trying it.

Here's what you need. First a *title card* for each book is produced and filed alphabetically. It contains all the information about publisher and author, date, pages, etc. It is one of many cards needed for the book, but it is the basic card. All other cards contain the same information plus a subject designation for subject or cross-reference cards.

You needn't have any expertise with Library of Congress systems or even the simpler Dewey Decimal method. Use your own system. Mine is described a few paragraphs from here.

Next you'd want a *shelf list card*. It's identical to the title card but it's filed in a different location—numerically by the call number of the book. This file drawer then becomes your guide to the books in the order they appear on your shelf. Don't panic because *call numbers* were mentioned. You needn't have any expertise with Library of Congress systems or even the simpler Dewey Decimal method. Use your own system. Mine is described a few paragraphs from here.

The Cards

Both the title card and the shelf list card look alike. They are characterized by the fact that they have no cross-reference or subject heading printed at the top of the card (see Figure 1).

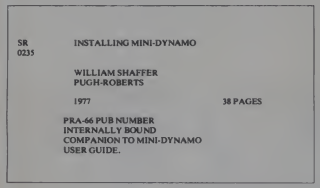


Figure 1

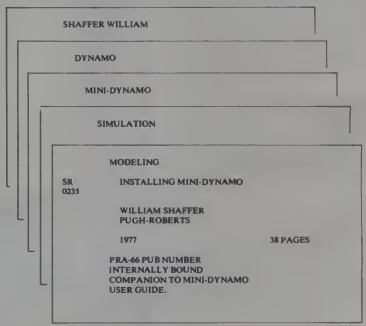


Figure 2

Stephen J. Rogowski, Computing Center, State University of New York, Albany, NY 12222.

UNTIL TODAY THERE WERE MORE THAN 20 DATA BASE MANAGERS FOR THE APPLE II.
NOW THERE'S ONLY ONE!

DB MASTER

THE APPLE DATA BASE MANAGER YOU'VE BEEN WAITING FOR!

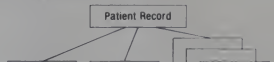
If you want an easy-to-use, flexible, and versatile data base manager, you have a choice of one. DB MASTER from Stoneware Microcomputer Products - soon to become the standard by which all others will be judged.

But don't just take our word for it. Compare the many advanced features of DB MASTER with the data base manager you're now using. Or for that matter, compare it with any data base manager on the market. No one will even come close.

FEATURES	DB MASTER	OTHER DBMS
FILING SYSTEM		
Maximum search time to find any record by its primary key	UNDER 3 SECS	
True ISAM file system with multi-field primary keys	YES	
Multiple secondary keys for rapid access (5-7 seconds) to records by any field	YES	
Primary & Secondary keys maintained automatically—no need to rebuild keys after adding records	YES	
Maximum record size (bytes)	1020	
Maximum number of fields/record	100	
Handles files with more than one diskette of data	YES	
Custom disk operating system (DOS) for faster data retrieval and program chaining	YES	
User-designed screen formats	YES	
Up to 9 screen "pages" per record	YES	
Ten field types, including dollar/cents, phone & social security number, date, etc.	YES	
Automatic data compaction for increased disk storage capacity	YES	
Wild card, partial string, range and Boolean search capabilities	YES	
Dynamic prompting (tm) - lists all available functions on screen—no need for quick reference card.	YES	
Password file protection	YES	
Four function calculator mode	YES	
Daily update lists for printout of all records added/edited on any day or range of dates	YES	
REPORT GENERATOR		
Send reports to screen or printer	YES	
Sort on up to 6 fields at a time	YES	
Column subtotals and totals	YES	
Subtotal and page breaks	YES	
Up to 24 computed fields per report	YES	
Up to 9 lines of column titles	YES	
Up to 9 lines for each record	YES	
Maximum number of fields per report	100	
Code fields - store short codes, print long descriptions	YES	
Comment lines and footnotes	YES	
Comment fields for printing labels or headers within each record	YES	
Summary only reports	YES	

Have a more complex application? DB MASTER can be used to emulate the hierarchical data base manager s used with larger computer systems!

A typical Hierarchical File Structure:



(Learn more about emulating a hierarchical data base in our 140 page user's manual.)

Coming soon:
DB MASTER UTILITY PAK #1. Add, drop or change fields in existing files without re-entering data!
Interchange DB MASTER files with VisiCalc® and other programs!
DB MASTER FOR HARD DISK SYSTEMS
DB MASTER FOR THE APPLE III

STONEWARE
MICROCOMPUTER PRODUCTS
50 Belvedere Street San Rafael CA 94901 (415) 454 8500

Apple, Apple II & Apple III are trademarks of Apple Computer Inc. VisiCalc is a trademark of Personal Software Inc.

CIRCLE 265 ON READER SERVICE CARD

CATCARD, continued...

All the other cards for a certain book are characterized by an additional line at the top. If the author's name appears there, it is called an *author card*. Other cards with this additional line are called *subject* or *cross-reference cards*. For example, the cards below might all refer to the book whose title card is shown in Figure 1. The top card is an author card. The others are subject areas under which you would reasonably expect to find the book (see Figure 2).

Notice that since the title is *Installing Mini-Dynamo*, and would be filed under *I*, the additional cross-reference for *Dynamo* and *Mini-Dynamo* are necessary. Always be aware of where the card which you are producing will fit in the alphabetical scheme of things. Better to have too many cross-references scattered throughout your file than too few. If the title card will be filed in such a way as to include a major cross-reference do not include that cross-reference in your list. For example: *BASIC—A Programming Language* needn't have a separate cross-reference under *BASIC* since the title card will obviously fall alphabetically in that section.

```
SR,INSTALLING MINI-DYNAMO
0235,X
WILLIAM SHAFFER,PUGH-ROBERTS
1977,38
PRA-66 PUB NUMBER
INTERNALLY BOUND
COMPANION TO MINI-DYNAMO
USER GUIDE
X
SHAFFER WILLIAM,DYNAMO,MINI-DYNAMO
SIMULATION,MODELING,X
X,X,X
---
SR,PASCAL USER MANUAL
0230,AND REPORT
K. JENSEN & N. WIRTH,SPRINGER-VERLAG
1976,167
SECOND EDITION
X
WIRTH & JENSEN,JENSEN & WIRTH,PASCAL
X,X,X
X,X,X
---
SR,MICROCOMPUTER PROBLEM SOLVING
0231,USING PASCAL
KENNETH L. BOWLES,SPRINGER-VERLAG
1978,563
X
BOWLES KENNETH L.,MICROCOMPUTER,PASCAL
PASCAL PROBLEM-SOLVING,X,X
X,X,X
---
SR,THE GASP IV USER'S
0232,MANUAL
ALAN B. PRITSKER,PRITSKER & ASSOC
1977,100
X
PRITSKER A. ALAN B.,USER MANUAL,GASPIV
SIMULATION,X,X
X,X,X
---
SR,CHARGING FOR COMPUTER SERVICES:
233,PRINCIPLES AND GUIDELINES
BERNARD/EMERY/NOLAN/SCOTT,PETROCELLI INC
1977,120
X
BERNARD DAN,EMERY JAMES G.,NOLAN RICHARD L.
SCOTT ROBERT H.,X,X
X,X,X
```

Figure 3

Try it by hand?

In order to produce all these cards by hand you might have to type as many as a dozen cards. All twelve will contain the same information, except for an additional line on all but three cards. Your computer system—even the tiniest—should be ideal for printing these cards if you have an output device that can print on card stock. You need only enter information about each book once, add some cross-references and have the computer do the work of typing all the cards.

Here's how CATCARD works. Figure 3 shows a typical data set for five books in my library. Rules have been typeset for clarity in separating each entry and do not appear in the actual data. In fact no special separator is needed between entries, they are simply run together.

The data is in the following general form:

```
LIB #,TITLE
LIB #,REST OF TITLE
AUTHOR,PUBLISHER
DATE,# OF PAGES
COMMENT LINE 1
COMMENT LINE 2
COMMENT LINE 3
COMMENT LINE 4
COMMENT LINE 5
COMMENT LINE 6 OR AN X IF LESS THAN 6
CROSSREF1,CROSSREF2,CROSSREF3
CROSSREF4,CROSSREF5,CROSSREF6
CROSSREF7,CROSSREF8,CROSSREF9
```

Figure 4

Each of the first four lines has two items separated by a comma. You really don't need to worry about how I've labeled each field. What's important is where the contents of any given field are placed in the final output. Figure 5 shows how the mask above maps onto the card. Note the indents for the cross-reference and the comments.

About 50 characters will fit across the card. More if you use an output device which can select 12 or more characters/inch as an option. Fifty is predicated on 10 characters/inch. This number will determine how many characters to allow in each field.

I also stick colored dots on cards of books which aren't on my shelves at home, and little clips on books which I'm using and have scattered throughout the house. Each clip color represents a room the book is sitting in or a friend whose borrowed it.

Comment Lines

Two fields are provided for the title, so you shouldn't have to abbreviate too heavily. Up to six lines of comments can be used to write something pertinent about the book. Any field which you don't have information for should be filled with an *X*. If you don't need all the comment lines, tell the program when you're done commenting by putting an *X* by itself on the line following the comments. If you use exactly six comment lines leave out the final line with the *X*. If you have no comments put a line with an *X* on it after the DATE,PAGE line. The last three lines have three entries per line. Each of these entries will produce a cross-reference card. If you have fewer than the nine cross-references allowed fill out with *X*'s. You must have a total of nine when you add cross-references to *X*'s in the last three lines.

You must include the author's name—last name first—in the cross-

```
CROSSREF1

LIB #     TITLE
LIB #     REST OF TITLE

          AUTHOR
          PUBLISHER

          DATE                    # OF PAGES

          COMMENT LINE 1
          COMMENT LINE 2
          COMMENT LINE 3
          COMMENT LINE 4
          COMMENT LINE 5
          COMMENT LINE 6
```

Figure 5

UNLEASH YOUR MIND WITH OUR DREAM MACHINES.

Our products are a breed apart from the clutter of other "computer" games that so often are no more than hyped-up video games giving you pretty pictures and little substance. After the novelty has worn off, they are quietly discarded. In our opinion, this is a pretty poor value.

Not so with our games.

STATE-OF-THE-ART PROGRAMS

At Strategic Simulations Inc, our state-of-the-art simulation programs are designed with one purpose: to provide you with computer games unmatched in sophistication, excitement, realism, and playability.

All of which translates into one word: fun. Lasting fun, because they are designed by thinking men for the Thinking Man.

With a little help from your imagination, our software will convert your Apple® into a veritable Dream Machine that transcends the barriers of time and space.

OUR UNIVERSAL DREAM MACHINES.

If your idea of a truly great game is one where more than manual dexterity is required – where planning and plotting based on strategic and tactical skills are essential to victory – then we're thinking along the same lines.

Speaking of lines, our complete and ever-expanding line of quality games will fit your needs perfectly – whether you're into historical wargaming, fantasy/science fiction, business, or sports simulations.

You see, our designers' creativity knows no bounds.

UNCOMPROMISING STANDARDS

As varied as our programs may be, they all share common features without which they could not meet our demanding standards.

To approximate the "you-are-there" feeling so desirable in game playing, all our simulations are created with loving attention to accuracy and meticulous detail.

In recognizing the difficulty of always finding a ready and able human opponent, we have made sure the computer can serve as your adversary in solitaire play. And if you are expecting a pushover, you're in for quite a surprise!

For those dedicated to the ultimate gaming experience, we have exactly what you've been looking for.

We've made quite a statement, and we're ready to back it up. Our 14-day money back guarantee is your assurance of complete satisfaction.

ORDER YOUR DREAM MACHINE TODAY.

If you own an Apple®II 48K (Applesoft ROM) and a 5¼" mini-floppy disc drive, you can own our Dream Machines today and unleash your mind.

Credit card holders, call 800-227-1617, ext. 335 (toll free) and charge your order to your VISA or MASTERCARD. In California, call 800-772-3545, ext. 335.

To order by mail, send your check to: Strategic Simulations Inc, Dept. CC1, 465 Fairchild Drive, Suite 108, Mountain View, CA 94043.

- ☐ COMPUTER BISMARCK™: $59.95.*
- ☐ COMPUTER NAPOLEONICS™: $59.95.
- ☐ COMPUTER CONFLICT™: $39.95.
- ☐ THE WARP FACTOR™: $39.95.
- ☐ CARTELS & CUTTHROATS™: $39.95.
- ☐ COMPUTER AMBUSH™: $59.95.
- ☐ COMPUTER QUARTERBACK™: $39.95.
- ☐ COMPUTER AIR COMBAT™: $59.95.
- ☐ OPERATION APOCALYPSE™: $39.95.
- ☐ TORPEDO FIRE™: $59.95.

*COMPUTER BISMARCK™ is available for TRS-80 cassette 32K: $49.95; and TRS-80 48K disc: $59.95.

As part of our demanding standards of excellence, we use maxell floppy discs.

Apple is a registered trademark of Apple Computer Inc.

TRS-80 is a registered trademark of the Tandy Corporation.

CIRCLE 201 ON READER SERVICE CARD

CATCARD, continued...

references If you want an author card. The program was designed this way for two reasons. First it allows the author to be listed first name first in the author field. The program is simpler if it doesn't have to parse and invert the author's name to produce the card. I have also found many books where I don't want an author card. This is especially true when I'm cataloguing slides and such where that field isn't wanted at the top of every card.

Catalog Numbers

The catalog number—LIB #—is one that you assign. I usually use two letters followed by four digits. *S* for *Steve* followed by some other letter which represents the general content of the book:

SW	Woodworking
SC	Computers
SS	Speed Skating
SG	Graphics
ST	Typesetting
SR	Reference
etc.	

Three letters may allow more latitude and would certainly fit on the card with no modification of the program. For new books the numbers simply represent the order in which I acquired the books. Though I must admit the process was somewhat random when I started out. Of course, each book needs to be marked either with white ink or gummed and glued labels. They are kept on the shelf alphabetically by catalog number and sorted numerically within each mnemonic category.

Slides

For my slides I use a number of the form *SL####* which is stamped on each slide mount. A sequential metal ink stamper is handy since it automatically sequences after each impression and looks very neat. Slide entries become simpler and have lots of *X*'s for filler, but I cross-reference each slide extensively, noting such things as location, content, subject matter and even the names of the people in each slide.

You need only enter information about each book once, add some cross-references and have the computer do the work of typing all the cards.

Error Checking

This DATA can be stored in a file or as DATA statements. Before you actually print cards certain kinds of errors must be removed from the data. A missing comma can cause problems and error-off the program. An extra comma is quite common. On my system the extra comma is fatal. It creeps in on comment lines when I enter a date such as *March 3, 1978* and have forgotten that a comma should not appear in a line except as a separator for the string variables. Comment lines are read in as one variable, so no commas are allowed. Use slashes (/) or semi-colons (;) as separators if you need them. The program below, Program 1, is for checking the data for errors of that kind. It'll make sure you have enough commas and the right number of lines.

Of course, you'll have to check for typos and other errors by hand. Don't try to run the second program until the data is clean. Cards are expensive. I usually always do a trial run on cheap paper just to make sure.

Three functions in the error program may not be familiar to all users of Basic. TRM$ trims trailing blanks from a string. SER and SEP locate commas in the named variables and return the column in which they appear. SEP is one argument more sophisticated than SER in that it allows the search to start at a column other than one—*C1 + 1* in this case.

When your data are clean run the program below:

```
100 FILE #1:'CATCARD1'
110 MARGIN #1:100
120 STRING$ 200
130 L=0
140 FOR X=1 TO 4
150     LINPUT #1:A$
160     L=L+1
170     LET C=SER(A$,',')
180     IF C=0 THEN 'MISSING COMMA IN LINE 'L
190 NEXT X
200 FOR X=1 TO 6
210     LINPUT #1:A$
220     L=L+1
230     A$=TRM$(A$)
240     IF A$='X' THEN GO TO 320
250     LET C1=SER(A$,',')
260     IF C1=0 THEN GO TO 310 ELSE PRINT 'ILLEGAL COMMA IN LINE ';L
270     LET C2=SEP(A$,',',C1+1)
280     IF C2<>0 THEN PRINT 'MISSING FINAL X IN COMMENTS IN LINE ';L
290     T=0
300     GO TO 340
310 NEXT X
320 T=0
330 IF T<3 THEN LINPUT #1 AS ELSE 140
340     T=T+1
350     L=L+1
360     LET C1=SER(A$,',')
370     LET C2=SEP(A$,',',C1+1)
380     IF C2<>0 THEN 330
390     IF T<=3 THEN PRINT 'MISSING COMMA IN LINE ';L
400 IF MORE #1 THEN 140
410 END
```

Program 1

```
Program 2

 5 DIM RS(12)
 6 RS(12)=''
 7 RS(11)=RS(10)=''
 8 INPUT 'FS
10 FILE #1:'FS
30 INPUT #1:A$,B$
40 INPUT #1:C$,D$
50 INPUT #1:E$,F$
60 LINPUT #1:G$,P$
70 LINPUT #1:H$
80 IF H$='X' THEN 400
90 LINPUT #1:I$
100 IF I$='X' THEN 400
110 LINPUT #1:J$
120 IF J$='X' THEN 400
130 LINPUT #1:K$
140 IF K$='X' THEN 400
150 LINPUT #1:L$
160 IF L$='X' THEN 400
170 LINPUT #1:M$
400 IF D$='X' THEN D$=''
410 IF E$='X' THEN E$=''
420 IF F$='X' THEN F$=''
430 IF G$='X' THEN G$=''
440 IF H$='X' THEN H$=I$=J$=K$=L$=M$='' ELSE 460
450 GO TO 600
460 IF I$='X' THEN I$=J$=K$=L$=M$='' ELSE 480
470 GO TO 600
480 IF J$='X' THEN J$=K$=L$=M$='' ELSE 500
490 GO TO 600
500 IF K$='X' THEN K$=L$=M$='' ELSE 520
510 GO TO 600
520 IF L$='X' THEN L$=M$='' ELSE 540
530 GO TO 600
540 IF M$='X' THEN M$=''
600 INPUT #1:RS(1),RS(2),RS(3)
610 INPUT #1:RS(4),RS(5),RS(6)
620 INPUT #1:RS(7),RS(8),RS(9)
630 FOR N=2 TO 9
640 IF RS(N)='X' THEN J=N+2 ELSE 660
650 GO TO 670
660 NEXT N
665 J=12
670 FOR M=1 TO 9
680 IF RS(M)='X' THEN RS(M)=''
690 NEXT M
700 FOR L=1 TO J
710 PRINT #2:''
720 PRINT #2:TAB(9),RS(L)
730 PRINT #2:''
740 PRINT #2:TAB(1),A$,TAB(11),B$
750 PRINT #2:TAB(1),C$,TAB(11),D$
760 PRINT #2:''
770 PRINT #2:TAB(11),E$
780 PRINT #2:TAB(11),F$
790 PRINT #2:''
800 IF P$='0' OR P$='X' THEN 830
810 PRINT #2:TAB(11);G$,TAB(35),P$,' PAGES'
820 GO TO 840
830 PRINT #2:TAB(11),G$
840 PRINT #2:''
850 PRINT #2:TAB(9);H$
860 PRINT #2:TAB(9),I$
870 PRINT #2:TAB(9),J$
880 PRINT #2:TAB(9),K$
890 PRINT #2:TAB(9),L$
900 PRINT #2:TAB(9),M$
910 PRINT #2:''
920 NEXT L
930 IF MORE #1 THEN 38
1020 END
```

This program actually prints the cards. It will produce three cards without cross-references plus as many additional cards as their are cross-references in the data. The first three cards are used as follows:

1) *Title Card*—to be filed alphabetically by title;

2) *Shelf List Card*—to be filed in a separate drawer numerically by catalog number. This drawer then represents a list of your books or slides as they appear on your shelf or in your slide folder. I also use this card as my master card. Any information which I consider inappropriate for all cards would be noted here. I also stick colored dots on cards of books which aren't on my shelves at home, and little clips on books which I'm using and have scattered throughout the house. Each clip color represents a room the book is sitting in or a friend whose borrowed it;

3) *Spare Card*—which I also file numerically in a separate shelf list drawer. This card is used when I look for a book under what I consider an appropriate subject area only to find I had not cross-referenced it there. Just slip out the spare card, type in the new reference and file alphabetically.

On my system the extra comma is fatal. It creeps in on comment lines when I enter a date such as March 3, 1978 and have forgotten that a comma should not appear in a line except as a separator for the string variables.

Card Suppliers

All other cards are cross-reference cards and should be filed alphabetically. The cross-references are printed high on the card and slightly offset, so that they stand out as the cards are flipped in their drawers. Special cards with index tabs or heavy-weight separator cards are ideal to set off subjects areas with lots of cards. Both the continuous form cards and the index tab cards are available at most library supply houses or from:

Visible Computer Supply Corp.
3626 Stern Drive
St. Charles, IL 60174
($8.65 for 1000 cards)

Josten's
Library Service Division
1301 Cliff Road
Burnsville, MN 55337
(expensive, heavyweight card
$30.00 or so per 1000)

The cards I use are 3" × 5" when burst. They are 3" × 6" with feed holes attached. Six feed holes on each side, spaced ½" on centers seems to be standard. Avoid cards which are preburst (partially) and are holed out for the center wire found on most card catalog drawers. They are more expensive and tear very easily while going through the printer.

At ten lines per inch horizontally, fifty characters will fit across each line. Using six lines per inch vertically, 18 full lines will fit on a card (see Figure 6).

Figure 6

The program makes these assumptions. Of course, not all 50 characters are used since blank space is designed into the format.

There are exactly 18 PRINT lines in the program (710 to 910). It may look like more than 18 but the DATE,PAGE card can be printed in two forms. The word PAGES will automatically follow the number of pages unless that field contains a zero or an *X*, in which case the field is left blank and the word PAGES doesn't appear. I have shown all PRINT statements printing to a file. This allows me to check and restart. To run directly in real-time, just change all the PRINT #2's to simple PRINT's. The TABS in the PRINT statements assure the alignments which I have diagramed.

It is a trivial matter to modify the program to change the alignment of output fields or to accomodate cards with dimensions other than 3" × 5". The program does not alphabetize the cards. It could be modified to do that but only at considerable expense in memory space and run time.

The program can be shaped to fit your particular needs. It is such a simple concept that it would be a shame not to get your books, slides or whatever organized. □

"NIBBLE IS TERRIFIC" (For Your Apple)

NIBBLE IS:
The Reference for Apple computing!
NIBBLE IS:
One of the Fastest Growing new Magazines in the Personal Computing Field.
NIBBLE IS:
Providing Comprehensive, Useful and Instructive Programs for the Home, Small Business, and Entertainment.
NIBBLE IS:
A Reference to Graphics, Games, Systems Programming Tips, Product News and Reviews, Hardware Construction Projects, and a host of other features.
NIBBLE IS:
A magazine suitable for both the Beginner and the Advanced Programmer.
NIBBLE is focused completely on the Apple Computer systems.
And each issue features significant new Programs of Commercial Quality.
Buy NIBBLE through your local Apple Dealer or subscribe now with the coupon below.
Try a NIBBLE!

NIBBLE
Box 325, Lincoln, MA 01773
(617) 259-9710
I'll try nibble!
Enclosed is my $17.50 (for 8 issues)
☐ check ☐ money order
Your subscription will start with the first issue after receipt of your payment. (Outside the U.S. see below)*
Name
Address
City
State
Zip

First Class or Air Mail is requested for all APO, FPO and all foreign addresses with the following additional amounts:
USA, Canada, Mexico, APO, FPO $7.50
Central and South America, APO, FPO $9.00
Europe $12.00
Asia and elsewhere $15.00
1980 by MICRO SPARC, INC. Lincoln, MA 01773 All rights reserved
* Apple II is a registered trademark of Apple Computer Company

CIRCLE 197 ON READER SERVICE CARD

Executive Privilege

Leland D. Young

Have you ever felt a little uneasy about using the Exec text file feature that is available on your Apple DOS 3.2 to increase the flexibility of your programs? Maybe my experience can help.

The Problem

My experimenting with Exec was prompted by a problem I faced with a program I was writing. This program, Flog, maintained golf handicap data in files which were stored on the same disk as the program. Good practice to protect such data files required that they be placed on a separate backup disk. In addition to this requirement, I wanted the backup disk to have the full capabilities of the original disk. That is, the backup disk would contain not only the data files, but also Flog and any other programs necessary to make the backup disk perform exactly as the original. Not much of a problem for a dual disk drive system, but more complicated with only one drive available, which was my case.

The original programs presented here serve as good examples for learning some of the inner-workings of a 48K Apple II. As written originally, the sequence of programs would run as follows: The main program (Flog) would update and maintain data files on golf players and place these files on the original disk. When the use of Flog ended, it would automatically load backup, take the data files from the original disk, load them into memory and, before pausing, display a message on the TVT such as "REMOVE ORIGINAL DISK - INSERT BACKUP DISK." When the backup disk was in the drive unit the data files in memory would then be transferred to the backup disk. After the transfer operation was completed, Backup then created an Exec file called Chek. At this point the backup disk would still be in the disk drive. After the creation of Chek, it was automatically run. This was done by the last statement shown in Listing 1.

Leland D. Young, 12603 Forest Hills Dr., Tampa, FL 33612.

During the execution of Chek, each line would be evaluated by the computer and the proper action taken. Backup, as shown in Listing 1, is not the complete program with the capability of transferring data files. Instead, the Backup listing only shows the portion containing the Exec file Chek.

The purpose of Chek is to determine if Flog and Backup are on the backup disk (which is now in the drive unit). If, for example, Flog is not on the backup disk, then Chek proceeds to display the message "REMOVE BACKUP DISK - INSERT ORIGINAL" and wait for the "Return" key to be hit. When the original disk is in place and the "Return" is hit, Flog is loaded into memory from the original disk. When loading is complete, the message "REMOVE ORIGINAL DISK - INSERT BACKUP" is displayed and the computer again waits for a "Return." When the backup disk is in place and the "Return" key is hit, Chek then determines if Backup is on the backup disk. If it is not, then the same steps as explained above for Flog are taken. When all CHEK statements are evaluated the message "BACKUP OPERATION COMPLETED - END PROGRAM" is displayed on the TVT unless the sequence of inserting the original and backup disks is altered. If this occurs, the statement "END PROGRAM - INVALID SEQUENCE" is displayed instead and all operations cease.

This article will describe how Chek operates. The logic of Chek in the use of IF statements and the flow of the statements will not be covered. The use of Call statements, memory locations and subroutines and how they can be used with Exec will be discussed.

The EXEC File

With the Exec command you can create a sequential text file that may contain commands or program lines (numbered or unnumbered) including Basic statements. These statements, when executed, control the computer as if the same information were typed on the keyboard. Exec does not delete a program that is already in memory. These features enable Chek to function.

CHEK Preliminaries

When writing an Exec file, a format of sorts should be followed. In its most fundamental form, the format requires: 1) the definition of the Control-D character, 2) the use of the OPEN and WRITE statements preceding the file, 3) the contents of the file and 4) the use of the CLOSE statement.

The Control-D character is defined so that the DOS commands OPEN, WRITE and CLOSE can be executed by the program.

I noticed a peculiarity about the Control-D during my trials with Chek. The DOS version 3.2 Instruction and Reference Manual, in discussing its example Exec file DOIT on page 75, states that the commands which are PRINTed into the file, for later EXECing, are not preceded by a Control-D. I found that this can be done if a line contains only the DOS command and nothing else. However, if anything precedes a DOS command, the Control-D character becomes necessary. See Listing 1, line 20080, for an example of where the Control-D is needed. Also, I found it best not to have any statements following a DOS command on the same line. When this is done, the statements following the DOS command on the line are ignored.

Notice in line 20010 of Listing 1 the definition of Q$ where CHR$(32) is the ASCII code for a quotation mark. Review Listing 1 to see how it is used in Chek to prepare strings for printing, as in lines 20140, 20150, 20170, etc.

Checking for a Program

When Chek is executed, it immediately determines if the program Flog is stored

Microsystems — the CP/M and S-100 User's Journal

CP/M is the software bus!
S-100 is the hardware bus
for sophisticated microcomputer users!

If you are a CP/M user, on any system—S-100, Apple, TRS-80, Heath, Ohio Scientific, Onyx, Durango, Intel MDS, Mostek MDX, etc—after all CP/M is the Disk Operating System that has been implemented on more computer systems than any other DOS—then *Microsystems* magazine is the "only" magazine published specifically for you!

Or, if you use an S-100/IEEE-696 based computer—and the most sophisticated microcomputer systems available use the S-100/IEEE-696 hardware bus—then *Microsystems* magazine is the "only" magazine published specifically for you!

We started publishing *Microsystems* almost two years ago to fill the void in the microcomputer field. There were magazines catering exclusively to the TRS-80, Apple, Pet, Heath, etc. system users. There were also broad based publications that cover the entire field but no one system in depth. But no magazine existed for CP/M users—nor did one exist for S-100 users.

The why and what of a software bus

First of all what is a "bus?" And why do we call CP/M "the software bus?"

A "bus" is a technique used to interface many different modules. Examples are the "S-100/IEEE-696 Bus" and the "IEEE-488 Bus." These are hardware buses that permit a user to plug a bus-compatible device into the bus without having to make any other hardware modifications and expect the device to operate with little or no monification.

CP/M is a Disk Operating System (DOS). It was first introduced in 1974 and is now the oldest and most mature DOS for microcomputer systems. CP/M has now been implemented on over 250 different computer systems. It has been implemented on hard disk systems as well as floppy disk systems. It is supported by two user groups (CP/M-UG and SIG/M-UG) that have released over sixty volumes containing over 1,600 public domain programs that can be loaded and run on systems using the CP/M DOS. Add to this another 1,500 commercially available CP/M software packages and you have the largest applications software base in existence.

CP/M is the only DOS for micros that has stood the test of time (seven years) with the highest level of compatibility from version to version. And over the years this compatibility has been maintained as new features have been added.

This is why we say "CP/M is the software bus" and why *Microsystems* magazine is vital to providing CP/M users with technical information on using CP/M, interfacing to CP/M, new CP/M compatible products and for CP/M users to exchange ideas.

Why support the S-100 bus?

S-100 is currently the most widely used microcomputer hardware bus. It offers advantages not available with any other microcomputer system. Here are a few of the advantages:

S-100 is processor independent. There are already thirty different S-100 CPU cards that can be plugged into an S-100 bus computer. Nine 8-bit microprocessors are available: 6502, 6800, 6802, 6809, 2650, F8, 8080, 8085 and Z80. Eight 16-bit microprocessors are available: 8086, 8088, 9900, Z8000, 68000, Pascal Microengine, Alpha Micro (similar to LSI-11) and even the AMD2901 bit slice processor. Take your pick from the incredible offerings.

S-100 has the greatest microcomputer power. What other microcomputer system has direct addressing of up to 18 megabytes of memory, up to 85,536 I/O ports, up to 10 vectored interrupts, up to 16 masters on the bus (with priority) and up to 10 Mhz data transfer rate? You will have to go a long way to use up that computing power.

S-100 is standardized. The S-100 bus has been standardized by the IEEE (Institute of Electrical and Electronic Engineers) assuring the highest degree of compatibility among plug-in boards from different manufacturers. And, *Microsystems* has published the complete IEEE S-100/696 standard (all 26 pages).

S-100 has the greatest hardware support. There are now over sixty different manufacturers of about 400 different plug-in S-100 boards. Far greater than any other microcomputer system.

With all these advantages is it any wonder that S-100 systems are so popular with microcomputer users who want to do more than just play games?

For the serious computer user.

Each issue of *Microsystems* brings you the latest in the CP/M and S-100 world. Articles on applications, tutorials, software development, product reviews, and lots more, to keep you on top of the ever changing microcomputer scene.

And if you are an S-100 system user using other operating systems (e.g. North Star) *Microsystems* also supports you.

Get your copy today

Order your susbscription to *Microsystems*. Send $10 for one year (6 issues), $18 for two years (12 issues) or $24 for three years (18 issues). If you prefer, call our toll-free number, **800-631-8112** (in NJ 201-540-0445) to put your subscription on your MasterCard, Visa or American Express card. Canadian/Mexican and other foreign surface subscriptions are $15 and $25, respectively, per year and must be prepaid. We guarantee that you will be completely satisfied or we will refund your subscription.

Join thousands of *Microsystems* subscribers like Jim Johnstone of Los Altos CA, who said *"Microsystems* has lived up to your promises and my expectations. Congratulations."

the CP/M® and S-100 user's journal

MICROSYSTEMS

a Creative Computing publication

39 East Hanover Avenue
Morris Plains, NJ 07950, USA
Toll-free 800-631-8112
(in NJ, 201-540-0445)

Privilege, continued...

```
10  REM BACKUP
20  REM L.D.YOUNG  APPLESOFT
40 C1$ = "('RETURN' TO CONTINUE)"

60 DD$ = CHR$ (4): REM CNTRL-D
20000  REM
20010 O$ = CHR$ (34):L = 0:Y = 0

20020  PRINT DD$"BLOAD MESSG"
20030  PRINT DD$"MON C:I:O"
20040  PRINT DD$"OPEN CHEK"
20050  PRINT DD$"DELETE CHEK"
20060  PRINT DD$"OPEN CHEK"
20070  PRINT DD$"WRITE CHEK"
20080  PRINT "POKE6,0:PRINTDD$"O$
    "LOCK FLOG"O$
20090  PRINT "X=PEEK(43619):IFX<>
    7THENL=1"
20100  PRINT "IFL=1THENCALL778:VT
    AB20:PRINTTAB(9)C1$:CALL768"

20110  PRINT "IFL=1THENPOKE6,1:CA
    LL832"
20120  PRINT "DD$=CHR$(4)"
20130  PRINT "L=PEEK(6):IFL=1THEN
    Y=PEEK(43619)"
20140  PRINT "IFL=1ANDY=1THENPRIN
    TDD$"O$"SAVE FLOG"O$
20150  PRINT "IFL=1ANDY=1THENPRIN
    TDD$"O$"LOCK FLOG"O$
20160  PRINT "IFL=1ANDY=1THENL=0:
    POKE6,0:INEW"
20170  PRINT "IFY=1THENPRINTDD$"O
    $"LOCK BACKUP"O$
20180  PRINT "IFY=1THENX=PEEK(436
    19)"
20190  PRINT "IFY=1ANDX<>7THENL=1
    "
20200  PRINT "IFY=1ANDL=1THENCALL
    778:VTAB15:PRINTTAB(9)C1$:CA
    LL768"
20210  PRINT "IFY=1ANDL=1THENPOKE
    6,2:CALL832"
20220  PRINT "L=PEEK(6):IFL=2THEN
    Y=PEEK(43619):IL=1"
20230  PRINT "IFY=1ANDL=1THENCALL
    783:VTAB20:PRINTTAB(9)C1$:CA
    LL768"
20240  PRINT "IFY=1ANDL=1THENPRIN
    TDD$"O$"SAVE BACKUP"O$
20250  PRINT "IFY=1ANDL=1THENPRIN
    TDD$"O$"LOCK BACKUP"O$
20260  PRINT "IFY=1ANDL=1THENNEW"

20270  PRINT "IFY=0ORY=1THENCALL
    198:HOME:VTAB9:PRINTTAB(10)"
    O$"BACKUP OPERATION COMPLETE
    "O$"!PRINT!PRINTTAB(16)"O$"E
    ND PROGRAM"O$
20280  PRINT "IFY<>0ANDY<>1THENHO
    ME:CALL-198:VTAB9:PRINT"O$"E
    ND PROGRAM - INVALID SEQUENC
    E"O$
20290  PRINT DD$"CLOSE CHEK"
20300  PRINT DD$"EXEC CHEK"
```

Listing 1.

on the backup disk. This check can be done by using other statements (RENAME, for example) but I chose to use the LOCK statement. When Flog is placed on a disk it is also LOCKed, so the logic for the test is that if Flog can't be found it cannot be locked, and the error statement FILE NOT FOUND will be printed by DOS. Of course, if the file is on the backup disk, LOCK will ensure the program is locked. Conveniently, if Flog is locked already, using LOCK will not cause an error. Looking at line 20090 in Listing 1, if X 7 (see Table 1) then Flog is assumed not to be on the disk.

	MEMORY LOCATION	
ERROR STATUS	$AA63 (Hex)	43619 (Dec)
LOAD	01	1
CATALOG	06	6
LOCK	07	7
LANGUAGE NOT AVAILABLE	18	24
FILE NOT FOUND	4B	75
FILE LOCKED	77	119
FILE TYPE MISMATCH	A9	169

Table 1. Codes and memory location for 48K system.

Making a Pause

Next I had to find out how to make Chek pause until the operator was ready for the computer to continue. If the check for Flog showed it was not on the backup disk, the program would have to wait for the backup disk to be removed and original disk inserted in the drive unit, displaying the proper instructions to the operator.

The pause subroutine is shown in Listing 2 at hexadecimal (denoted by $ preceding the number) locations $0300-$0309. This subroutine is called by the statement CALL 768, where 768 is the decimal equivalent of $0300. The ASCII characters used in the assembly language subroutines were taken from the ASCII Screen Character Set, Table 7 of the Apple Reference Manual. From this Set, $A0 represents a "space", and $8D represents a "Return."

The pause subroutine functions by putting a "space" character ($A0) into the accumulator then jumping to location $FD1B which is the start of a subroutine that looks for an input from the keyboard. When a key is pressed the subroutine then returns to $0305 with the accumulator containing the character entered at the keyboard. The contents of the accumulator is then compared with a "Return" character ($8D). If the two are not equal the subroutine moves to $0300 and repeats the procedure again. If the key pressed is a "Return" the subroutine then returns to the main program. This subroutine would function acceptably if $A0 were not placed in the accumulator initially, but a character may be displayed on the TVT if the "Return" is not the first key hit.

Displaying a Message

When the pause subroutine is in operation, there should also be a message displayed on the TVT directing the operator to perform some task. In our case, if Flog is not on the backup disk Chek must pause for a response from the operator afer displaying a message. The initial message is "REMOVE BACKUP DISK—INSERT ORIGINAL." Also the statement "('RETURN' TO CONTINUE)" is displayed at the bottom of the TVT. Referring to Listing 1, this sequence of events is handled by line 20100 where CALL 778 ($030A) causes the initial disk message to be displayed. CALL 768 causes the pause subroutine to operate until a "Return" is entered at the keyboard.

Detecting an Error

When an Exec file does not execute statements using line numbers, error detecting is different from that normally used in Basic programs. Chek is such a program. Although line numbers are used in Backup (which creates Chek), the execution of Chek is done in the order of the statements contained in the file and not as determined by line numbers. Line numbers, however, can be given to the statements easily. For examples of both possibilities see lines 20120 and 20130 of Listing 1.

When Chek is executed, only the information contained within the quotation marks will be executed. But line numbers could be assigned to the statements if desired as in the following example:

```
20120 PRINT"150 DD$ = CHR$(4)"
20130 PRINT"160 L=PEEK(6):IF L=1
          THEN Y=PEEK(43619)"
```

The problem with assigning line numbers is that these lines become a part of any program that may be in memory. That is, if Flog is in memory, and Chek is created with line numbers, as in the above example, these line numbers belonging to Chek are treated by the computer as part of Flog. So if Flog is then SAVEd, the saved version of Flog will contain not only the Flog statements but also the numbered Chek statements. Flog is then altered and if run could function improperly. For this reason Chek was developed without using line numbers.

The absence of line numbers in Chek solved one problem but created another. That is, how can errors be detected by Chek? If the ONERR statement could be used, a code would be placed in decimal location 222 ($DE) when an error occurred. But ONERR can't be used as there are no line numbers to reference. Another location then must be found.

After searching magazine articles, reviewing the DOS subroutines and experimenting, I was able to find a location that consistently contains a code associated with a particular status or error. This location (in a 48K system) is decimal 43619 ($AA63). Codes placed in this location are listed in Table 1. I have not verified this, but my guess is that in a

A NEW ANGLE

ON AN OLD FAVORITE!

announcing...

HI-RES CRIBBAGE

FOR THE APPLE II OR II PLUS COMPUTERS

ON-LINE SYSTEMS is now offering a Cribbage game to challenge even the best Cribbage player as you play against the computer. The cribbage board is done with beautiful Hi-Res Graphics and you can watch (and hear) the scores being pegged. The cards are dealt randomly; they actually look as if they are being turned over one by one by an invisible hand. If you're not careful, and don't play your cards right, the computer will skunk you. For the beginning Cribbage player, **HI-RES CRIBBAGE** comes with complete instruction and strategy aspects of the game. For the experienced Cribbage player, **HI-RES CRIBBAGE** offers a totally challenging game.

Hi-Res Cribbage is available now at your local computer store and requires a disk drive. To order directly send $24.95 to:

On-Line Systems
36575 Mudge Ranch Road
Coarsegold, CA 93614
209-683-6858

VISA, MASTER CHARGE, COD, CHECK ACCEPTED

CIRCLE 249 ON READER SERVICE CARD

BRAIN GAMES FROM PDI

Tired of shoot-em-up arcade games? Stimulate your brain for a change and have fun doing it. PDI has the best of the word puzzle games by Dr. Dean Victor for Atari*, Apple II* and TRS-80*.

MINICROSSWORD Computer invents a crossword puzzle on the screen. When the puzzle is formed, you fill in the words. If you can't supply a word, the computer will fill it in (and deduct points from your score!) Thousands of different puzzles can be generated.

WORD SEARCH Computer generates word search puzzles using either a Spanish, French or geography word list. Atari version uses color, sound and other special effects, and will even generate printed puzzles for you to do when away from the computer. This is an excellent way for students to practice foreign language vocabulary.

ASTRO-QUOTES This is an anagram-type game. The goal of the game is to guess a famous quotation. Clues are letters that the computer inserts in the correct slots in the quotation when the player correctly guesses the definitions of a series of words.

KROSS 'N QUOTES Quotation guessing game in which the player works against the clock. Player fills in the quote by picking scrambled letters and putting them in place using the joystick.

Available at Computerland and other fine computer stores, or, directly from us.

	16.95* Apple	23.95* Apple disk	16.95* TRS 80	16.95* Atari
Minicrossword	24K	48K	16K	24K
Word Search Geography	16K	32K	16K	16K
Word Search Spanish	16K	32K	16K	16K
Word Search French	16K	32K	16K	16K
Astro Quotes	16K	32K	16K	16K
Kross N Quotes	NA	NA	NA	16K

*plus $1.50 shipping and handling
*Apple is a trademark of Apple Computer Corp *TRS 80 is a trademark of the Tandy Corp *ATARI is a trademark of Atari Inc

PDI

Program Design Inc Department CA 11 Idar Court Greenwich CT 06830
203-661-8799

CIRCLE 214 ON READER SERVICE CARD

```
0300-   A9 AQ       LDA   $$A0     *PUT A 'SPACE' IN ACCUMULATOR
0302-   20 1B FD    JSR   $FD1B    *GET CHAR, FROM KEYBOARD
0305-   C9 8D       CMP   $$8D     *SEE IF IT'S A 'RETURN'
0307-   D0 F7       BNE   $0300    *IT ISN'T.  TRY AGAIN
0309-   60          RTS            *IT IS.  GOTO CALLING ROUTINE
030A-   A2 00       LDX   $$00     *SET UP MESSAGE *REMOVE BACKUP DISK - INSERT ORIGINAL *
030C-   4C 11 03    JMP   $0311
030F-   A2 01       LDX   $$01     *SET UP MESSAGE *REMOVE ORIGINAL DISK - INSERT BACKUP*
0311-   20 9D 03    JSR   $039D    *HOME, CLEAR & SET VERT.TAB TO 8
0314-   20 3A FF    JSR   $FF3A    *SOUND 'BELL'
0317-   18          CLC            *CLEAR CARRY
0318-   8A          TXA            *PUT CONTENTS X-REG.IN ACCUM.
0319-   A2 00       LDX   $$00     *ZERO X-REG.FOR 1ST LOCATION OF MESSAGE
031B-   C9 01       CMP   $$01     *COMPARE ACCUM W/ 1
031D-   F0 0E       BEQ   $032D    *IF ACCUM=1 THEN BRANCH TO $032D
031F-   BD A6 03    LDA   $03A6,X  *LOAD ACCUM. W/ INDEXED MEMORY CONTENT
0322-   C9 DB       CMP   $$DB     *SEE IF CHAR. IS A [
0324-   F0 15       BEQ   $033B    *IT IS.  BRANCH TO $033B
0326-   20 ED FD    JSR   $FDED    *IT ISN'T.  PRINT IT
0329-   E8          INX            *INCREMENT X-REG. FOR NEXT INDEXED CHAR.
032A-   4C 1F 03    JMP   $031F    *GOTO $031F TO CONTIN.MESSAGE
032D-   BD CB 03    LDA   $03CB,X  *LOAD ACCUM. W/ INDEXED MEMORY CONTENT
0330-   C9 DB       CMP   $$DB     *SEE IF CHAR. IS A [
0332-   F0 07       BEQ   $033B    *IT IS.  BRANCH TO $033B
0334-   20 ED FD    JSR   $FDED    *IT ISN'T.  PRINT IT
0337-   E8          INX
0338-   4C 2D 03    JMP   $032D
033B-   A9 00       LDA   $$00     *SET UP CURSOR TO LEFT SIDE OF SCREEN
033D-   85 24       STA   $24      *PUT 0 IN LOCATION $24 (CURSOR HORIZ.POSITION)
033F-   60          RTS            *RETURN TO CALLING ROUTINE
0340-   AD 58 9D    LDA   $9D58    *STORE CONTENTS OF $9D58 (LO BYTE ADDR.)
0343-   85 07       STA   $07      *INTO $07
0345-   AD 59 9D    LDA   $9D59    *STORE CONT. OF $9D59 (HI BYTE ADDR.)
0348-   85 08       STA   $08      *INTO $08
034A-   A9 57       LDA   $$57     *PUT LO BYTE OF $0357 (I.E. $57)
034C-   8D 58 9D    STA   $9D58    *INTO $9D58
034F-   A9 03       LDA   $03      *PUT HI BYTE OF $0357 (I.E. $03)
0351-   8D 59 9D    STA   $9D59    *INTO $9D59
0354-   20 D1 A4    JSR   $A4D1    *JUMP TO 'RUN' SUBROUTINE
0357-   20 0F 03    JSR   $030F    *JUMP TO 'MESSAGE' SUBROUTINE
035A-   20 00 03    JSR   $0300    *JUMP TO 'PAUSE' SUBROUTINE
035D-   A5 07       LDA   $07      *PLACE CONTENTS BACK INTO
035F-   8D F8 9D    STA   $9D58    *$9D58 AND $9D59 THAT
0362-   A5 08       LDA   $08      *WERE REMOVED
0364-   8D 59 9D    STA   $9D59    *EARLIER
0367-   60          RTS            *RETURN TO CALLING ROUTINE
*
*
*
039D-   20 58 FC    JSR   $FC58    *HOME AND CLEAR SCREEN
03A0-   A9 08       LDA   $$08
03A2-   20 5B FB    JSR   $FB5B    *SET VERT. TAB TO 8
03A5-   60          RTS            *RETURN TO CALLING ROUTINE
```

Listing 2. "MESSG."

32K system the equivalent decimal location would be 27235 ($6A63).

Loading from Exec

Some problems arose in the early stages of troubleshooting Chek when it loaded Flog into memory. Referring to Listing 1 the original statement used in line 20110 was

```
20110 PRINT"IFL=1THENPOKE 6,1:
PRINTDD$"Q$"LOAD FLOG"Q$
```

This functioned properly in loading Flog into memory, but when loading was completed, a program popped up related to the way in which the computer executes an Exec file. When an Exec file is created it is stored on disk. When the Exec file is executed, it is read from the disk into the file buffer of the Apple by sector and each field in succession is examined and acted upon. When the last field contained in the file buffer is handled, the next sector on disk is then read into the file buffer. It must be remembered that the Exec file Chek was created and placed only on the backup disk.

Let us recap the sequence of things. Chek has checked for Flog on the backup disk. It discovers that Flog is not there so it displays a message on the TVT telling the operator to replace the backup disk in the drive unit with the original disk (which has Flog on it) and pauses until the "Return" key is hit. Now the original disk, which does not contain the Exec file Chek, is in the disk drive. The program Flog is loaded into memory as required by the statement in line 20110. After this, the computer tries to read the next field (Chek statement) that is in the file buffer. In my case, nearly all of the statements in the file buffer were executed so that after Flog had been loaded, the computer had only one or two more fields to read. After reading these last remaining fields in the buffer the computer then tried to read the next sector of the Chek file from the disk. This could not be done as the original disk, which did not have Chek stored on it, was in the drive unit and everything came to a halt after a few irrelevant characters were printed on the screen.

To make things function properly it was necessary to get the backup disk into the drive unit before the computer tried to read the next sector of Chek. This is why I settled on line 20110 shown in Listing 1. The CALL 832 is the machine language subroutine that takes care of loading a program, displaying appropriate messages and pausing the program to enable the backup disk to be placed in the drive unit before things go awry. The CALL 832 subroutine is shown in Listing 2 at memory location $0340-$0367.

The Best is even Better...

by William Passauer

You Can't Work Harder, So Work Smarter

This program is important to you. We at Micro Lab have tested them all. "The Data Factory" is the most versatile data base system yet developed for the micro computer. This system was nationally rated as the best selling data base on the market, by a leading micro computer magazine. We have now expanded the original Data Factory with 40 new features on 3.3 DOS to make it even more powerful. The Mini Factory is almost identical to the original Data Factory program, and is a good introduction to the system at a very reasonable price. The Data/Mini Factory provides instant accessibility to your records and files which you can then, rearrange into new combinations to have vital information in seconds.

Get The Best

The Data/Mini Factory will solve your problems. Thousands of people have chosen it since we introduced it nationally last June. Major corporations have used it to handle jobs that they did not want to put on their large computers or that would be too time consuming or costly to program. Small businesses have used it to control their accounts receivable and accounts payable. Their mailing lists and sales records were easily maintained with the system. Churches, hospitals, and schools have kept their financial, inventory, and individual records up to date. Organizations, home users, and hobbyists reconciled check books, made library or collection lists, playing schedules, date reminders, and more.

Our Guarantee

This program will work. Micro Lab chooses to represent a very select group of professional programmers that meet our high standards for quality. Countless hours have been spent in our labs to insure these claims to you, and we back them with a contract with our dealers. Your Data Factory can always be updated when new versions of this program are released. The Mini Factory can be upgraded to The Data Factory when the users needs expand.

Most Advanced System

The latest breakthroughs in a data base system have been incorporated into this program. It was designed for constant use to input and manipulate data efficiently. The unique new feature that sets it apart from all others is its complete modifiability. Data may be rearranged, removing part of it from the original disk, to add to another or to form a new data base, without reentering the information again. Add, change, transfer, delete, replace, index, reconstruct, compute, and compare data at any time. Do an incredible 20 level search or sort and much more. The Data Factory is by far the best for performing the work that you must do from day to day.

Easily Learned

Any one can use it. The program prompts you as it runs. The easy to follow manual leads you through the set up of your data base. Data is stored on separate data disks, apart from the program. Only the data disks are copiable, allowing you to back up your data. The data file information is available for you to use with other programs.

Your Insurance

You can feel secure. Two identical programs are included with the original purchaser's package. If you make a mistake and accidentally blow a disk, there is no time or money lost. The Extended Warranty Policy is a revolutionary new plan for consumer protection. For a reasonable annual fee it covers all renewals needed on either The Data/Mini Factory and all updates adding new features to The Data Factory.

Requirements

The Data/Mini Factory is presently being offered for the Apple computer. You will need 48K and Applesoft in Rom. The system is as powerful with one disk drive as with two. It is slower but you do not lose any of its capabilities using only one disk drive. A printer or modem is an option with The Data/Mini Factory, but a 20 column board can be used only with The Data Factory. Micro Lab has developed another business system, "The Invoice Factory." It can work independently but is also compatible with the data on your Data/Mini Factory disks.

From A Dealer

"I have received 'The Data Factory' and I am pleased. It is everything that you represented and more. First, the packaging is impressive . . . Second, the manual is refreshingly well produced . . . Third, 'The Data Factory' does work! . . . I cannot ask more of a software package."

—Lyle Fernquist
Compudata Corp., Duluth, MN

Available Now

The Data Factory has a nationwide reputation as a reliable and easy to use data base. See a demonstration at your local Apple dealer. The price of The Data Factory is $150 and the Mini Factory is $75.

There are many reasons why you should buy the system—the ease of use, the features, the updates, Micro Lab's user support, and the fact that your investment in The Mini/Data Factory pays off in time savings every day. But you will find the best reasons when you ask someone who already has one. We are proud of our reputation and will keep working hard to maintain it.

micro lab
systems that work

3218 Skokie Valley Road
Highland Park, IL 60035 • 312-433-7550
CIRCLE 155 ON READER SERVICE CARD

Back Up, continued...

Loading with CALL 832

During my review of various publications, trying to get a handle on memory locations and subroutines that would be helpful to me. I found a memory map listing of the Apple II DOS 3.2 which showed the beginning addresses of many DOS subroutines for a 48K system. This memory map listing shows that the LOAD routine begins at decimal location 42003 ($A413). I was unable to use this subroutine successfully. If would load the program satisfactorily, but at its completion it would ignore Chek and return to the monitor. Rather than try to jump into the depths of the subroutine and figure out what memory locations needed to be modified, I took some time to see how the RUN routine beginning at decimal location 42193 ($A4D1) would work. RUN loads a program into memory then jumps unconditionally to another routine that executes the program just loaded. Thus, the trick was to change the destination address of this last jump so that instead of running the program just loaded, a routine of my choosing (i.e. the message routine at $030F) would be executed and Chek would not be side-stepped as in the LOAD routine.

The RUN routine, shown in Listing 4, is located at memory locations $A4D1-$A4E4. The unconditional jump, beginning at $A4E2, causes the routine to jump to the address contained in locations $9D58 and $9D59 where $9D58 holds the low byte address and $9D59 holds the high byte address of the routine that will run the program just loaded into memory.

The plan in using CALL 832 is to load the desired program (Flog in this case) using the loading part of the RUN routine in Listing 4 (locations $A4D1-$A4E1) but placing the beginning address into $9D58 and $9D59. In this case the address is

```
A4D1-   AD B6 AA     LDA    $AAB6
A4D4-   F0 03        BEQ    $A4D9
A4D6-   8D B7 AA     STA    $AAB7
A4D9-   20 13 A4     JSR    $A413
A4DC-   20 C8 9F     JSR    $9FC8
A4DF-   20 51 A8     JSR    $A851
A4E2-   6C 58 9D     JMP    ($9D58)
```

Listing 4. Run subroutine.

$0357 which is shown in Listing 2. By having the RUN routine jump to $0357, the desired message and pause subroutines can be run.

One way of placing the address $0357 into $9D58 and $9D59 is to take the contents of $9D58 and $9D59 and store them for the time being in safe locations, $07 and $08 in this case. Next the low and high bytes of $0357 itself (low byte, $57; high byte, $03) are placed in $9D58 and $9D59 respectively. See Listing 2 locations $0340-$0353 for this procedure.

When the unconditional jump is made to $0357, a jump to the message subroutines is made. After the message is displayed, the subroutine then returns to $035A and execution continues with the pause subroutine (beginning at $0300) which waits for the operator to exchange the disks and hit the "Return" key. Now we have the backup disk in the drive unit again and the computer can read all the sectors it wants without causing any problems.

Before leaving the CALL 832 subroutine, however, a little housekeeping is in order. It seems, if for no other reason than good practice, that the original contents should be returned to $9D58 and $9D59. This is done in locations $035D-$0366. Location $0367 returns the CALL-832 process.

General

Some of the things used in Backup (Listing 1) should probably be explained a little further. Line 20020 loads the machine language routines found in Listing 2. These routines could be loaded by another program (such as Flog) and used as needed no matter what Basic program or Exec file happened to be in the computer. These machine language routines will not be disturbed unless the programmer does so deliberately or DOS is booted again.

Lines 20040 and 20050 of Listing 1 clear Chek to make sure no information contained in it from a previous use will interfere with its proper functioning. If this is not done it is possible that Chek could accumulate statements and characters that would adversely affect its proper execution.

Zero page locations $06, $07 and $08 have been used because they are apparently free for programmer use. I say this in reference to the memory maps depicted in the Apple manuals which show these locations free from use by any functions of the Apple. According to the Apple II Reference Manual, $09 is also available. Additionally, a portion of page three can be used safely by the programmer in locations $0300-$03EF.

Line 20120 of Listing 1 is necessary because the process of loading a program clears variables. The PEEK and PEEK functions are used with location $06 to maintain variable information after the LOAD routine is used also.

The NEW command in lines 20160 and 20260 is used to remove from memory Basic programs loaded into memory. This is done to ensure that the backup operation is completed with no program in memory that can be run. The Control-D character is not needed for NEW as it is not a DOS command.

Listing 3 is included to show the complete file "MESSG." The message used by the subroutines beginning at $031F and $032D use the characters stored in locations $03A6-$03CA and $03CB-$03EF respectively. The character set used was taken from Table 7 of the Reference Manual where $C1=A, $C2=B, etc.

The way a message is displayed by "MESSG" can be seen by looking at the locations $031F-$032A of Listing 2 and locations $03A6-$03CA of Listing 3.

```
0300- A9 A0 20 1B FD C9 8D D0
0308- F7 60 A2 00 4C 11 03 A2
0310- 01 20 9D 03 20 3A FF 18
0318- BA A2 00 C9 01 F0 0E BD
0320- A6 03 C9 DF F0 15 20 ED
0328- FD E8 4C 1F 03 BD CB 03
0330- C9 DF F0 07 20 ED FD E8
0338- 4C 2D 03 A9 00 85 24 60
0340- AD 58 9D 85 07 AD 59 9D
0348- 85 08 A9 57 8D 58 9D A9
0350- 03 8D 59 9D 20 D1 A4 20
0358- 0F 03 20 00 03 A5 07 8D
0360- 58 9D A5 08 8D 59 9D 60
0368- 00 00 00 00 00 00 00 00
0370- 00 00 00 00 00 00 00 00
0378- 00 00 00 00 00 00 00 00
0380- 00 00 00 00 00 00 00 00
0388- 00 00 00 00 00 00 00 00
0390- 00 00 00 00 00 00 00 00
0398- 00 00 00 00 00 20 5B FC
03A0- A9 0B 20 5B FB 60 D2 C5
03A8- CD CF D6 C5 A0 C2 C1 C3
03B0- CB C5 D0 A0 C1 C9 D3 CB
03B8- A0 AD A0 C9 CE D3 C5 D2
03C0- D4 A0 CF D2 C9 C7 C9 CE
03C8- C1 CC DB D2 C5 CB CF D6
03D0- C5 D2 A0 D2 C9 C7 C9 CE
03D8- C1 CC A0 C4 C9 D3 CB A0
03E0- AD A0 C9 CE D3 C5 D2 D4
03E8- A0 C2 C1 C3 CB D5 D0 DB
*
```

Listing 3. Machine language listing of "MESSG."

CALL -198 executes a subroutine that sounds the "bell."

Conclusion

I hope that this article has provided you with some insight into how Exec can be used, and that the not-too-obvious subroutines will be useful. Once you get into these areas you may uncover some of the secrets of the Apple computer yourself and share them with other Apple users. □

CENTRONICS 101A PRINTERS, 9 X 7 matrix, 165 CPS, 132 col., normal factor letter quality, up 10 5 copies, width variable from 4"-5", 6 lines/inch, 10 CPI, parallel data input, full 90 day warranty (Wt. 118 lbs.) $650.00

I.B.M. SELECTRIC KEYBOARD PRINTERS (Model 72) with GTE interface electronics to standard RS-232 Serial 25 pin connection. 15 CPS, 15 inch carriage, 10 pitch interchangeable elements, 90 day warranty (Wt. 50 lbs.) $650.00

(PA residents add 6% sales tax on orders) Make checks or money orders payable to: **AMERICAN CUSTOM ELECTRONIC SYSTEMS,** Box 157A, Groveland Rd., Piperville, PA. 18947. (Add .50 per pound shipping/handling fee)

CIRCLE 108 ON READER SERVICE CARD

Legal Services

Computer Law / Business Law

Attorney at Law with 10 yrs. technical background in Computer Systems. Serving San Francisco Bay Area. Initial consultation without charge. Out-of-office appointments arranged.

Lawrence Nadan (415) 570-1259.

CIRCLE 174 ON READER SERVICE CARD

micro lab presents

DOGFIGHT

NEW FOR THE APPLE

BY BILL BASHAM

A NEW CHALLENGE

DOGFIGHT will capture your imagination. You are the pilot of a jet going into combat. You may fly alone on this mission, or you may have another pilot flying with you to defeat the enemy. First you fly against one enemy jet. You are in complete control: fly faster or slower, turn left or right — but most importantly, FIRE. If you are shot down, and you act quickly, you can bail out. You and your parachute float gently downward, hoping an enemy plane does not shoot you. If you survive, you will quickly return to the fierce dogfight. The enemy can also bail out!! You must shoot him down before he has a chance to return.

THE ENEMY RETURNS

Each time you defeat all enemy jets or helicopters, you advance to the next level where you fly against faster and/or more enemy planes. There are sixteen levels of difficulty to fight through. Bill Basham, the talented author of this high resolution program, has made it through only 8 levels before his planes were destroyed.

MANY WAYS TO PLAY

DOGFIGHT may be played in several different ways. You, alone, may challenge the computer, or, two players may fly against the computer — either on the same team or on different teams. With DOGFIGHT you can create your own custom game with as many as eight players crowding around your Apple keyboard controlling their own planes. You may select jets or helicopters on any level — be a daredevil with 7 computer jets against you. You are in charge with the custom mode.

FOR THE ACES

Micro Lab will award a special achievement plaque to the first 10 pilots who reach 10,000 points in any of the auto modes (one player, two players same team, two players different teams). A special, individual, secretly coded message will appear when reaching that score. Report that code to Micro Lab to claim the Ace title.

AVAILABLE NOW

The Dogfight is available on disk at your Apple Dealer for $29.95.

micro lab
systems that work

811 STONEGATE • HIGHLAND PARK, IL 60035
312-433-7877

CIRCLE 156 ON READER SERVICE CARD

DISCOVER THE 6809 IN YOUR COLOR COMPUTER

Now you can explore the Radio Shack Color Computer's impressive potentials—as an inexpensive development system, a color peripheral, a process controller—ad infinitum. The Micro Works introduces these powerful software tools for utilizing the color computer at the assembly language level.

MONITOR TAPE: A cassette tape which allows you to:

- Examine or change memory using a formatted hex display
- Save areas of memory to cassette in binary (a "CSAVEM")
- Download/upload data or programs to a host system
- Move the video display page throughout RAM
- Send or receive RS-232 at up to 9600 baud
- Investigate and activate features of your computer, such as hi-res graphics or machine-language music
- Use your color computer as an Intelligent peripheral for another computer, a color display or a 6809 program development tool

The monitor has 19 commands in all, and is relocatable and re-entrant.
80C Monitor Tape Price: $29.95

MONITOR ROM: The same program as the monitor tape, supplied on ROM. This allows BASIC to use the entire RAM space. And you don't need to re-load the monitor each time you use it. The ROM plugs into the Extended Basic ROM Socket or a modified ROMPACK.
80C Monitor ROM Price: $39.95

C BUG IS HERE!!

INSIDE THE COLOR COMPUTER: This package is a disassembler which runs on the color computer and enables you to generate your own source listing of the BASIC interpreter ROM. Also included is a documentation package which gives useful ROM entry points, complete memory map, I/O hardware details and more. Disassembler features include cross-referencing of variables and labels; output code which can be re-assembled; output to an 80-column printer, small printer or screen; and a data table area specification which defaults to the table boundaries in the interpreter ROM. A 16K system is required for the use of this cassette.
80C Disassembler Price: $49.95

THE MICRO WORKS

Mastercharge and BankAmericard

P.O. BOX 1110 DEL MAR, CA 92014 714-942-2400

CIRCLE 245 ON READER SERVICE CARD

Bombproof Data Entry—A Revision

Susan Luca

At the time I read Greg Kielian's article "Bombproof Data Entry" in the November 1980 issue of *Creative Computing*, I was dealing with a similar problem. However, I found that his approach was not adequate for my needs since the routine does not allow back spacing to one character while maintaining the other data.

The problem I was dealing with required the entry of notational text which could be from one to three lines, with a line containing up to 36 characters. Another criterion was that a "beep" should be heard at thirty spaces to signal that five more letters could be input on that line. I found that the back spacing which erased all input letters it back spaced over was very frustrating when trying to change one letter near the beginning of the line.

Therefore, I decided to incorporate an array with the get statement. By using the array input the backspace and forward space could be used without losing any correct data.

The elements of the array are not concatenated until the "return" is pressed or until the end of the line is reached; in this case the line has a maximum of 36 characters. The following is a line-by-line explanation of the routine, which is written in Basic for the Apple II Plus.

10 Dimensions the array.

20 Clears the screen.

30 Prints information on the screen.

40 Sets the cursor to edge of screen.

50 Sets the counters to 1. "B" is the line indicator. "T" is the number of input letters or spaces.

60 Sets the number of lines to 3.

70 Prevents the array counter from being less than 1.

75 Gets the input letter. Puts the letter in an array and prints the letter.

80 Checks for a backspace and returns to get a new input.

80 Checks for a forward space and returns to get a new input.

100. Checks for control character inputs which are not accepted.

110 Looks for a return at less than thirty spaces. This would end the input. The array is then concatenated.

120 Looks for the return and concatenates the array.

130 Sounds the "beep" at thirty characters.

140 If the input reaches 36 characters the line is ended and the next line is started.

150 The counter is increased and the program returns to get another input.

160 The screen is cleared.

170 The first line is printed.

180 Second line is printed.

190 Third line is printed.

200 The routine ends.

```
5  REM  DATA INPUT BY ARRAY
6  REM  SUSAN LUCA
10  DIM DX$(38)
20  HOME
30  VTAB 9: HTAB 5: PRINT "ITEM:"
40  VTAB 11: HTAB 1
50 B = 1:T = 1
60  IF B > 3 THEN  GOTO 160
70  IF T = 0 THEN T = 1
75  GET DX$(T): PRINT DX$(T);
80  IF  ASC (DX$(T)) = 8 THEN T = T - 1: GOTO 70
90  IF  ASC (DX$(T)) = 21 THEN T = T + 1: GOTO 70
100  IF  ASC (DX$(T)) < 32 AND  ASC (DX$(T)) <  > 13 THEN  GOTO 70
110  IF  ASC (DX$(T)) = 13 AND T < 30 THEN  FOR S = 1 TO T - 1:DES$(B) = D
     ES$(B) + DX$(S): NEXT S: GOTO 160
120  IF  ASC (DX$(T)) = 13 THEN  FOR S = 1 TO T - 1:DES$(B) = DES$(B) + DX
     $(S): NEXT S:B = B + 1:T = 1: GOTO 60
130  IF T = 30 THEN  PRINT "";
140  IF T = 36 THEN  FOR S = 1 TO T:DES$(B) = DES$(B) + DX$(S): NEXT S:B =
     B + 1:T = 1: PRINT : GOTO 60
150 T = T + 1: GOTO 60
160  HOME
170  VTAB 5: HTAB 1: PRINT DES$(1)
180  VTAB 6: HTAB 1: PRINT DES$(2)
190  VTAB 7: HTAB 1: PRINT DES$(3)
200  END
```

Susan Luca, GSP Computer Resources, Inc., 9 Ash St., Hollis, NH 03049.

micro lab presents

Crown of Arthain

By Dan and Marilyn Meller

Gather round ye Knights and Ladies. Behold! I tell ye of a new game written by Sir Dan and Lady Marilyn Meller. One encounters a challenging test of skill that only the bravest should attempt. The consequences are dire.

I know thou hast seen games played on wooden boards before. While this game has a board divided into hex shapes, it cannot be played on a table top! This one is played only on an Apple. It is a new game — of a type you have never before seen. Fierce monsters of types you have heard spoken of, but never dreamed you would look upon, appear lifelike before your very eyes.

In the Kingdom of Arthain, the good King lies dying. His sons, Princes Berthain and Merthain, previously banished, have been summoned. The one who successfully fords the stream, crossing through hexes of forests and lakes to find the proper passage to the underground mountain hall where the crown lays, could win the Kinghood. He must accumulate gold to buy the map to aid him on this dangerous journey. Monsters are lurking everywhere. But take heed and listen to my wise counsel. A new more powerful and dangerous creature guards the Crown. The prince who tries to get the crown must have much experience along with a high defense and attack factor. Magical aids he encounters along the way will help.

This one or two player high res color adventure can be played on twenty skill levels. While almost any knave can win the crown at the easier skill levels, only the most practiced nobleman can win at the highest levels. One must be a skillful and expert swordsman to win the Kinghood at Level 1. He must be prepared to thrust, hack, or shield his weapon at any moment or be mercilessly destroyed. Only the alert and clear-headed will succeed. Go with God.

Make haste if you wish to see this high res adventure game at your Apple dealer. One needs any Apple computer with 48K and Applesoft in ROM. The "Crown of Arthain" is priced at $35.

HEAR YE! HEAR YE!

NEW FOR THE APPLE

micro lab

systems that work

3218 Skokie Valley Road • Highland Park, IL 60035
312/433-7550

CIRCLE 152 ON READER SERVICE CARD

apple®

At last! The programs that have driven TRS-80 owners into oblivion are available for the **Apple II and the Apple II Plus!** ***Deathmaze 5000, Labyrinth,*** and the incredible ***Asylum*** are among the first full, 3-D perspective graphic adventures that take advantage of the advanced features of the Apple microcomputer!

These programs feature **full upper/lower case text mixed with full-screen, hi-res graphics!** Graphics generation is virtually instantaneous! None of these adventures can be solved in a single evening. Or even a single week!

What do we mean by 3-D perspective? We mean that you can actually see what you're doing and where you're going! And yes, extensive English language vocabularies are always available to the user!

SATISFACTION IS GUARANTEED!
We know that our claims may be hard to believe. If you are not satisfied with our products, we allow you to return the programs for a prompt and cheerful refund within 14 days of receiving them!

". . . truly one of the best adventure games by any criteria . . . it borders on the unbelievable. Believe it. Buy it." ***M.J.M., The Space Gamer***

"This has got to be the most infuriating, irritating, aggravating, frustrating, angering, spellbinding game on the market." ***D.M., '80 Microcomputing***

Deathmaze 5000	32K cassette	$ 12.95
Labyrinth	32K cassette	$ 12.95
Asylum	32K cassette	$ 14.95

DISKS: DOS 3.3, 48K required. Add $ 4.00 to price for programs on diskette. All three on a single diskette, $ 44.95. Tape versions include disk save option and can be saved to DOS 3.2 by the user.

MasterCard OR VISA

Med Systems Software
P.O. Box 2674-P Chapel Hill, NC 27514
(919) 933-1990

CIRCLE 221 ON READER SERVICE CARD

How to Solve It—With the Computer

Donald T. Piele

"The development of the electronic computer has profoundly and irrevocably changed the scientific world. In so doing it has simultaneously created numerous opportunities for the application of mathematical ideas and methods to the solution of traditional scientific problems and made possible the exploration research areas in mathematics and the sciences either previously unattainable or undreamt of. We are, in consequence, living in one of the great times of intellectual history."—Bellman, Cooke & Lockett (1970)

In 1970, when this paragraph first appeared in the preface to the book, *Algorithms, Graphs, And Computers*[1], owning a computer was the privilege of government, large corporations, higher education, and other large institutions. Today, owning a computer is within the reach of local government, small businesses, primary and secondary schools, and private individuals. This has created more opportunities for the application of computer problem-solving techniques than could be imagined in 1970. As the capabilities of microcomputer systems increase in the coming years and as more people become familiar with computer programming techniques, the magnitude of the impact of computers will undoubtedly go beyond what we can imagine. Thus, for the growing number of people who are making an effort to understand how to solve problems with the computer, it is indeed a time of great intellectual growth and understanding.

Project CAMP

The idea of using computer programming to help students develop a better understanding of the problem-solving process is becoming more practical each year. But like most ideas, it is not new. Fifteen years ago, it was the major emphasis of a pre-college program named CAMP under the direction of David C. Johnson of the University of Minnesota.

Project CAMP (Computer Assisted Mathematics Program), developed at the University of Minnesota High School in the mid 1960's, was one of the first attempts to use the computer as a tool to develop problem-solving ability. The primary objectives of the project were these:

1) Test the following hypotheses:

a) The computer is an effective laboratory tool in solving mathematics problems.

b) The computer is an effective instructional aid for demonstrating and reinforcing mathematical concepts.

c) The computer is an effective tool for testing algorithms devised by students; programming the computer furthers the development of problem-solving ability.

d) The use of a computer is a means of building computational skills.

Donald T. Piele, University of Wisconsin, Parkside, Kenosha, WI 53141.

2) Identify the content in the mathematics curriculum for grades 7-12 where computer concepts can be successfully utilized in instruction.

The project produced six books, one for each grade 7-12, designed around the Basic language in a time-sharing environment. The authors gave careful attention to identifying particular problem-solving situations in which students could develop algorithms. The algorithms chosen were consistent with the mathematics curriculum of the grade level, so that no extra teaching was necessary. Thus, the topics considered in the CAP books were included in the modern mathematics books of that grade level.

The results of the experiment, as reported by the authors, indicated that the computer was an invaluable device for demonstrating mathematical concepts. The computer enabled them to do a better teaching job, because students could learn about the process for solving a problem, which is often the real goal of the lesson. It was the belief of the CAMP authors that: "A real problem can be thought of as a situation for which the student, or problem solver, does not have an established procedure or algorithm that can be automatically applied to find a solution. Students have little opportunity to develop their own algorithms in the conventional textbook problem where the algorithm is given and the exercises simply ask the student to apply it in a number of situations."

The computer also proved to be an excellent tool for teaching problem-solving. There were many instances in CAMP where students were given the opportunity to design an algorithm, program it, and then run it on the computer. If it didn't work, the student revised the procedure and tested it again, until it "worked." This type of "real world" problem-solving, which is extremely difficult for a teacher to provide, was found to be inherent in computer programming activities.

As good as the CAMP materials were for their time, the materials limited themselves to traditional mathematical algorithms usually found in mathematics textbooks. They did not introduce computer techniques and strategies that take advantage of the strengths of the computer—high speed computation and decision-making combined with the structures of graphs, networks, stacks, and queues and employing search, sort, merge, backtracking, recursion, and branching strategies. These concepts, which are currently studied in university-level data structures courses, are beginning to filter down to the pre-college level as they become needed by those interested in solving problems with the computer. As we grow in our ability to use the computer effectively, these ideas will be introduced much earlier. And it is these ideas coupled with the computer, that will give the students of the future the ability to be original problem solvers.

It is the intent of this series to give examples of these strategies in a wide variety of problem-solving settings which can be used in the classroom for students to work on and learn from.

Lynn Busby, president of the Computer Station, as seen by the Dithertizer II.

You and your Apple can have a new view of the world.

Dithertizer!

Dithering. Developed at Bell Labs and MIT, dithering was originally an approach to picture transmission. Compared to other methods, dithering is fast and accurate.

The Dithertizer II was designed for the Apple computer by David K. Hudson, a researcher at MIT. Design goals were high accuracy, fast scanning, maximum reliability and an economical price.

High Quality Images

The resolution is of the Dithertizer is the maximum the Apple can handle in the high-resolution mode, i.e., 280 x 192 (53,760) pixels.

To produce an image, a video camera is focused on the subject. Peripherals Plus furnishes a Sanyo VC161OX camera, a laboratory/industrial unit with an f1.6 lens. This camera has a focus range of 18" (for extreme close ups) to infinity (for distant subjects).

The camera scans an entire frame in 1/60th of a second. Two frames are scanned, of course, in 1/30th of a second. By adjusting the blackness control (with Paddle 0) to any one of 255 levels you can determine the threshold of gray between the two frames.

A 1/30th second, two-frame scan has two levels of gray and produces a high-contrast but quite recognizable image.

Pictures or Contours

Using the "Contour" software routines and contrast control (Paddle 1), it is possible to subtract one image from another. If the blackness thresholds of the two images are close, say 125 and 127, the resulting image will show just the outlines or highlights of an object.

Another possibility is to reduce the contrast to zero which results in a nearly blank screen except for movement in the area scanned. This type of movement detector is much faster (1/30th second) and more precise than other much more expensive systems. It is currently being used to detect and record movement of laboratory animals. It is also used in security installations.

The "Dithering" software routines use the contrast control to divide an image into gray tones. As mentioned above, two levels (usually white and black) result in a high contrast image. Four gray levels provide additional definition while sixteen levels produce a highly detailed image in just over 1/4th of a second. Extremely high detail is possible using the highest 64-gray level setting. At this level, an image is produced in 64/60ths of a second or just over one second. The quality of this image is close to that of a halftone photograph found in a newspaper or magazine.

Using Dithered Images

What can one do with a dithered image? Upon completion it can be stored automatically in either page 1 or 2 of the high-resolution graphics area of the Apple. Hence, it can be printed out on practically any printer. To print it on an Apple Silentype printer or equivalent requires no additional software.

To take advantage of the automatic print routines in the Dithertizer itself does require additional software tailored to a specific printer. Software packages are available at $44.95 each for the following printers: IDS 440, 445, 460, and 560; IP225; Anadex DP9500 and DP9501; Spinwriter 5510 and 5520.

Individual images or series of images may also be incorporated in other programs in the same way that other hi-res graphics are used. Using VersaWriter software, for example, text may be added to images. An image may be shown on the screen while a disk is loading or while the computer is completing a time-consuming calculation in another program.

With the proper software, the Dithertizer can be used to perform image enhancement, to identify features, detect motion, track a moving target or create a detailed picture for display. The possibilities are limited only by your imagination.

Quality Construction

The dithertizer is manufactured to exacting specifications by Computer Station. It consists of the Dithertizer II board which plugs into Slot 7 in the Apple II, a cable which connects between the Dithertizer and motherboard and a 10 foot cable to the camera. The system requires a 48K Apple disk system.

The software package consists of three routines on disk: "Dither" to build a gray scale picture, "Contour" to produce an edge scan using image subtraction, and "Dscan" to store a binary image in either page 1 or 2 of the high-resolution graphics area.

Peripherals Plus also includes a Sanyo VC161OX video camera with external horizontal and vertical sync input.

The components of the packge – hardware, software and camera – are warranteed by the manufacturers against defects in material and workmanship for 90 days. In addition, Peripherals Plus guarantees that if you are not completely satisfied you may return the system for a prompt and courteous refund.

Order Today

The entire Dithertizer system consisting of the Dithertizer board, Sanyo camera, cables and software costs only $650 plus $6 shipping and handling in the continental United States. Customers in other loctions should write for shipping rates. Price for the board and software alone is $300 while the camera alone is $410. To order your system, send payment or Visa, MasterCard or American Express card number and expiration date to the adress below. Credit card customers may also call orders to our toll-free number.

Don't put it off. Remember, your system is backed by both manufacturer warranties and a complete moneyback guarantee of satisfaction from Peripherals Plus.

Give your Apple a new view of the world with a Dithertizer. Order today.

Peripherals Plus

39 East Hanover Avenue
Morris Plains, NJ 07950
Toll-free **800-631-8112**
(In NJ 201-540-0445)

DISCOUNT

Ad#13 SOFTWARE

✓ out our new items.

CP/M users specify disk systems and formats. Most formats available

	DISK WITH MANUAL	MANUAL ONLY
CP/M®		
ARTIFICIAL INTELLIGENCE		
✓ Medical	$449/$40	
✓ Dental	$449/$40	
COMPLETE BUS. SYSTEM		
Creator	$269/$25	
Reporter	$169/$20	
Both	$399/$45	
COMPUTER CONTROL		
✓ Fabs	$159/$20	
UltraSort II	$159/$25	
COMPUTER PATHWAYS		
Pearl (level 1)	$ 99/$25	
Pearl (level 2)	$299/$40	
Pearl (level 3)	$549/$65	
DIGITAL RESEARCH		
CP/M 2.2		
NorthStar	$149/$25	
TRS-80 Model II (P&T)	$159/$35	
Micropolis	$189/$25	
Cromemco	$189/$25	
PL/I-80	$459/$35	
✓ BT-80	$179/$25	
Mac	$ 85/$15	
Sid	$ 85/$15	
Z-Sid	$ 95/$15	
Tex	$ 70/$15	
DeSpool	$ 50/$10	
DYNAMIC MICRO-PROCESSOR ASSOC.		
✓ Ascom	$109/$15	
CBS	$389/$45	
✓ DMA-DOS	$179/$35	
GRAHAM-DORIAN		
✓ General Ledger	$729/$40	
✓ Acct Receivable	$729/$40	
✓ Acct Payable	$729/$40	
✓ Job Costing	$729/$40	
Payroll	$493/$40	
Inventory	$493/$40	
Cash Register	$493/$40	
Apartment Mgt	$493/$40	
KEY BITS		
String/80	$ 84/$20	
✓ String/80 (source)	$279/$na	
WordSearch	$179/$25	
MICRO-AP		
S-Basic	$269/$25	
Selector III	$269/$25	
Selector IV	$469/$35	
MICRO DATA BASE SYSTEMS		
HDBS	$269/$35	
MDBS	$795/$40	
✓ DRS or ORS or RTL	$269/$35	
✓ MDBS PKG	$1295/$60	
MICROPRO		
WordStar	$324/$60	
✓ Customization Notes	$ 89/$na	
Mail-Merge	$114/$25	
WordStar/Mail-Merge	$434/$85	
✓ DataStar	$249/$80	
WordMaster	$119/$40	
SuperSort I	$199/$40	
MICROSOFT		
Basic-80	$294/$30	
✓ Basic Compiler	$329/$30	
✓ Fortran-80	$349/$30	
Cobol-80	$574/$30	
Macro-80	$144/$20	
Edit-80	$ 84/$20	
MuSimp/MuMath	$224/$25	
MuLisp-80	$174/$20	
ORGANIC SOFTWARE		
TextWriter III	$111/$20	
DateBook	$269/$25	
OSBORNE		
General Ledger	$ 59/$20	
Acct Rec/Acct Pay	$ 59/$20	
Payroll w/Cost	$ 59/$20	
✓ All 3	$129/$57	
All 3 + CBASIC-2	$199/$71	

PEACHTREE®	
General Ledger	$399/$40
Acct Receivable	$399/$40
Acct Payable	$399/$40
Payroll	$399/$40
Inventory	$399/$40
Property Mgt	$799/$40
CPA Client Write-up	$799/$40
Mailing Address	$349/$40
SOFTWARE WORKS	
Adapt	$ 69/$na
Ratfor	$ 88/$na
SOHO GROUP	
MatchMaker	$ 97/$20
WorkSheet	$177/$20
STRUCTURED SYSTEMS	
GL or AR or AP or Pay	$590/$40
Inventory Control	$449/$40
✓ Analyst	$199/$25
✓ QSort	$ 89/$20
SUPERSOFT	
✓ Forth (8080 or Z80)	$149/$25
✓ Diagnostic II	$ 84/$20
Other	less 10%
TCS	
GL or AR or AP or Pay	$ 79/$25
All 4	$269/$99
WHITESMITHS	
'C' Compiler	$800/$30
Pascal (incl 'C')	$850/$45
"DATA BASE"	
FMS-80	$649/$45
dBASE II	$629/$50
Condor	$599/$30
T I M	$329/$35
"PASCAL"	
✓ Pascal/MT+	$449/$30
✓ Pascal/Z	$349/$30
Pascal/UCSD	$299/$30
Pascal/M	$149/$20
"WORD PROCESSING"	
✓ SpellGuard	$249/$25
Spell Binder	$349/$45
✓ Magic Wand	$289/$45
✓ VTS/80	$489/$65
"OTHER GOODIES"	
Tiny C	$ 89/$50
Tiny 'C' Compiler	$229/$50
CBASIC-2	$ 89/$15
Nevada Cobol	$129/$25
MicroStat	$224/$15
Vedit	$ 99/$15
✓ Prof Time Bill (Asyst)	$549/$40
✓ ESQ-1	$1349/$50
✓ MiniModel	$449/$50
StatPak	$449/$40
✓ Micro B +	$229/$40
BSTAM	$129/$10
APPLE II®	
MICROSOFT	
Softcard	$292
Fortran	$179
Cobol	$574
PERSONAL SOFTWARE	
Visicalc	$122
CCA Data Mgr	$ 84
Desktop Plan	$ 84
Zork	$ 34
PEACHTREE®	
General Ledger	$224/$40
Acct Receivable	$224/$40
Acct Payable	$224/$40
Payroll	$224/$40
Inventory	$224/$40
"OTHER GOODIES"	
Super-Text II	$127
Data Factory	$129
✓ DB Master	$159
Ledger Plus	$549
✓ Charles Mann	less 15%
✓ STC	less 15%

ORDERS ONLY—CALL TOLL FREE VISA • MASTERCHARGE

1-800-854-2003 ext. **823** • **Calif. 1-800-522-1500** ext. **823**

Overseas – add $10 plus additional postage • Add $2.50 postage and handling per each item • California residents add 6% sales tax • Allow 2 weeks on checks. C.O.D. ok • Prices subject to change without notice. All items subject to availability • ®— Mfgs. Trademark

THE DISCOUNT SOFTWARE GROUP

6520 Selma Avenue, #309 • Los Angeles, CA 90028 • (213) 666-7677

Solve It, continued...

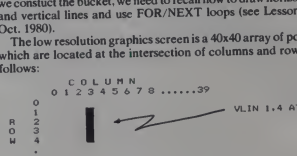
Lesson #7 (Beginning Students)

The Setting:

The water jug problem, which will be introduced in the intermediate and advanced lessons, is the setting for a beginning graphics problem of drawing a water container on the screen and filling it to a specified level with water. To keep the problem simple, we will make the jug into a bucket that takes only three lines to draw on the screen.

Where we draw the lines depends on the amount of water we want it to hold. Thus we must first agree on how much space is to be represented by a quart of water. On the Apple II in low resolution graphics, we will arbitrarily assign 10 squares to represent one quart of water. Thus if we wanted to draw a bucket with 10 quart capacity, it would need to contain 100 squares within its boundary. One way to draw the bucket which will hold 10 quarts is to locate a 10x10 block on the screen and draw a border around it on three sides. But before we construct the bucket, we need to recall how to draw horizontal and vertical lines and use FOR/NEXT loops (see Lesson #3 Oct. 1980).

The low resolution graphics screen is a 40x40 array of points which are located at the intersection of columns and rows as follows:



The statement VLIN A,B AT C draws a vertical line in column C beginning in row A and ending in row B. Similarly, the statement HLIN A,B AT C draws a horizontal line in row C beginning in column A and ending in column B.

The Problem:

One way to enter information into a program is to use the INPUT statement. For example, to prompt the user to enter the capacity of the bucket one could write:

```
INPUT "ENTER THE BUCKET CAPACITY
(QUARTS):";C
```

When the program is run, the words enclosed in quotes will appear on the screen while the computer waits for a numerical input which will henceforth be stored in C. The amount of water to be placed in the bucket could be entered in the same way.

```
INPUT "ENTER THE AMOUNT OF WATER TO POUR
IN:";A
```

To figure out where to place the horizontal and vertical lines that form the outline of the bucket, graph paper, which shows the 40x40 array of positions on the low resolution screen, should be used. Since the rows are numbered from top to bottom, to construct two vertical lines of length C at the bottom of the graphics screen which are 10 squares apart one could write:

```
VLIN 39-C,39 AT 14
VLIN 39-C,39 AT 25
```

This forces the bottom of the bucket to be:

```
HLIN 15,24 AT 39.
```

Pouring the water into the bucket can be done by drawing one horizontal line of length 10 for each quart of water to be added from bottom to top. This is best done with a FOR/NEXT loop.

```
FOR I=1 TO A
HLIN 15,24 AT 39-I
NEXT I
```

Notice that the first quart is drawn in row 38, the second at row 37, and so on up to the last quart at row 39-A. (Refer to the low resolution screen chart if you are lost.)

HUNTINGTON COMPUTING

PROGRAMS LISTED BELOW ARE ON DISK:

Apple Galaxian	$24.95 *now*	**$22.96**
EPYX (Automated Simulations) SPECIAL — While they last Ryn/Morloc/Rigel all three		**$39.99**
Galaxy Wars	$24.95 *now*	**$22.99**
Super Scribe	$89.95 *now*	**$76.39**
Interactive Fiction (cass.)	$14.95 *now*	**$13.99**
Alien Lander	$24.95 *now*	**$21.99**
Sorcerer/Doom Cavern	$20.00 *now*	**$17.99**
Hyper Head-On	$24.95 *now*	**$21.20**
Galactic Empire	$24.95 *now*	**$21.20**
Galactic Trader	$24.95 *now*	**$21.20**
Galactic Revolution	$24.95 *now*	**$21.20**
Golden Mountain	$19.95 *now*	**$16.95**
Tank Command	$14.95 *now*	**$13.49**
DB Master	$189.00 *now*	**$169.00**
Bloody Murder	$19.95 *now*	**$17.99**
Tranquility Base	$24.95 *now*	**$21.99**
Aristotle's Apple	$34.99 *now*	**$29.99**
Micro Memo	$39.95 *now*	**$35.99**
The Data Factory	$150.00 *now*	**$134.00**
Mission Asteroid	$19.95 *now*	**$17.99**
Vinyl holders for 20 disks in beautiful deluxe padded binder		**$13.99**
Skybombers II	$19.95 *now*	**$17.99**
Programmers Utility	$16.95 *now*	**$15.09**
DOS Tool Kit	$75.00 *now*	**$69.00**
Microsoft Adventure	$29.95 *now*	**$26.09**
Olympic Decathlon	$29.95 *now*	**$26.09**
Compu-Math: Arithmetic	$49.95 *now*	**$44.95**
Apple Plot	$75.00 *now*	**$69.00**
College Boards (Kreil)	$79.95 *now*	**$69.00**
Time Traveler	$24.95 *now*	**$22.99**
Sword of Zedek	$24.95 *now*	**$22.99**
CRAE 2.0	$24.95 *now*	**$22.99**
MCAT 2.0	$24.95 *now*	**$22.99**
The Tartunian	$19.95 *now*	**$17.99**
TI PROGRAMMER — Hexicemal/Octal Calculator Retail $65.00	$24.95 *now*	**$21.99**
MPI 88G Printer	*now*	**$599.00**
The Prisoner	$29.95 *now*	**$695.00**
The Wizard & The Princess	$32.95 *now*	**$26.99**
Compu-Spell	$39.95 *now*	**$28.99**
Computer Ambush	$59.95 *now*	**$34.99**
Computer Basmark	$59.95 *now*	**$52.99**
Computer Napoleonics	$59.95 *now*	**$52.99**
Computer Quarterback	$39.95 *now*	**$35.99**
Flight Simulator (disk)	$34.95 *now*	**$31.99**
Star Cruiser	$24.95 *now*	**$20.99**
Space Album	$39.95 *now*	**$24.50**
Odyssey	$29.95 *now*	**$25.50**
Both Barrels	$24.95 *now*	**$20.99**
Modifiable Database	$79.50 *now*	**$64.99**
Micro League Baseball	$24.95 *now*	**$22.99**
Sargon II	$34.95 *now*	**$29.78**
Program Line Editor	$40.00 *now*	**$34.99**
Retro-Ball	$29.95 *now*	**$25.99**
Space Eggs	$29.95 *now*	**$25.39**
Mystery House in French		**$23.99**
Z-80 Softcard	$349.00 *now*	**$299.00**
Videx 80-Col. Board	$350.00 *now*	**$299.00**
Head On	$24.95 *now*	**$20.99**
3D Super Graphics	$39.95 *now*	**$35.99**
Compu-Math I or II	$40.00 *now*	**$34.00**
HI-RES Cribbage	$24.95 *now*	**$21.99**
Phantom Five	$29.95 *now*	**$25.49**
Star Gazer's Guide	$30.00 *now*	**$25.39**
Lords of Karma	$20.00 *now*	**$16.99**
Tawala's Last Redoubt	$29.95 *now*	**$25.49**
Apple PIE & Formatter (Reg. $129.95)	Special	**$99.99**
Apple World	$59.95 *now*	**$52.99**
ABM (Muse)	$24.95 *now*	**$21.49**
Data Plot (Muse)	$59.95 *now*	**$52.99**
Computer Conflict	$39.95 *now*	**$35.99**
Computer Air Combat	$59.95 *now*	**$52.99**
Terrorist	$29.95 *now*	**$25.49**
The Temple of Apshai	$39.95 *now*	**$32.95**
Super-Text II	$150.00 *now*	**$128.99**
Magic Window	$99.95 *now*	**$85.00**
CCA Data Management	$99.95 *now*	**$85.00**
VISICALC	$150.00 *now*	**$118.99**
Thrilogy	$24.95 *now*	**$21.19**
Zork	$39.95 *now*	**$33.99**
Howardsoft Real Estate Analyzer	$150.00 *now*	**$129.99**
Super Disk Copy-Sensible	$30.00 *now*	**$25.49**
The Landlord	$795 *now*	**$649.99**
Teacher's Pet (Dynecomp)	$13.95 *now*	**$11.99**
Missile Defense	$29.95 *now*	**$25.39**
Acant: Fortune-telling	$15.00 *now*	**$8.99**
Horriblescope	$15.00 *now*	**$8.99**
Gomoku (cass.)	$14.95 *now*	**$11.99**
Reversal	$34.95 *now*	**$29.78**
16K NEC Memory		**$49.99**
Savage Island Adv. (cass.)	$14.95 *now*	**$12.78**
Baker's Trilogy	$24.95 *now*	**$21.99**

SUPER DISCOUNTS

apple® SOFTWARE

MEMOREX DISKS 10 for $24.99

Crosswords	$29.95 *now*	**$25.99**
Microgammon II	$19.95 *now*	**$17.99**
Pensoft	$29.95 *now*	**$25.99**
Dogfight	$29.95 *now*	**$25.99**
Cyber Strike	$39.95 *now*	**$34.99**
HI-RES Football (On-Line)	$39.95 *now*	**$26.99**
Fastgammon	$24.95 *now*	**$21.20**
The Voice	$39.95 *now*	**$33.99**
Beneath Apple Manor	$20.00 *now*	**$17.45**
Astro Apple	$20.00 *now*	**$17.45**
Akalabeth	$34.95 *now*	**$29.99**
ANDROMEDA 16K RAM Expansion Board for Apple II Retail is $195 — Our price		**$179.99**
NEC 12" Green/Black	$260 *now*	**$219.00**
Centronics 737 Printer	$995 *now*	**$799.00**
ROM + w/filter	$200 *now*	**$178.00**
M&R 80-col. Video Card	$375 *now*	**$325.00**
Versawriter	$249 *now*	**$219.00**
VERBATIM DISKS (Datalife w/hub rngs - unmarked) Ten for		**$27.99**
Spanish Hangman	$29.95 *now*	**$26.99**
Lazer Plus + L.C.A.	$59.95 *now*	**$49.99**
D.C. Hayes Modem	$379.00 *now*	**$299.00**
Data Factory 4.0	$60.00 *now*	**$52.99**
Hyperspace Wars	$29.95 *now*	**$23.39**
L.A. Land Monopoly	$29.95 *now*	**$25.39**
Sex-o-scope	$30.00 *now*	**$26.99**
Astroscope	$30.00 *now*	**$26.99**
The Warp Factor	$39.95 *now*	**$34.99**
DYSAN DISKS in plastic case 'Clock' Time Teaching Program		**10 for $49.95**
Apple II Animation Package (sublogic)	$29.95 *now*	**$26.99**
Dr. Daley's Software Library	$54.95 *now*	**$49.99**
Physics I (Educ. Courseware)	$79.95 *now*	**$69.99**
Basic Tutor I-VII (Introduction to Programming) Reg. $24.00 each	$24.00 *now*	**$21.49**
		$31.49 ea
Medical Office Management (CMA)	$449.95 *now*	**$404.99**
J&S Computer Chemistry	$150.00 *now*	**$139.99**
Cook's Touch Typing	$14.95 *now*	**$13.49**
PDI's Computer Programming	$59.95 *now*	**$38.99**
EAI Literal Comprehension (grades 2-4)	$39.95 *now*	**$35.99**
COMPAK MATH Grade by Concept	$495.00 *now*	**$445.49**
Hartley Prescriptive Math Drill	$79.95 *now*	**$71.99**
Hellfire Warrior	$39.95 *now*	**$33.99**
Memco Joy Stick	$60.00 *now*	**$54.99**
Scotch Disk Cleaning System		**$25.99**
Super Invader/Space Wars	$29.95 *now*	**$25.39**
Visiplot	$24.95 *now*	**$21.19**
Word Fun	$19.95 *now*	**$17.99**
Paper Tiger 560G	$1795.00 *now*	**$1499**
Mr. Com Music System	$545.00 *now*	**$478.99**
Apple Menu Cookbook	$19.95 *now*	**$16.99**
The Mailroom	$29.95 *now*	**$25.39**
Statistics	$15.95 *now*	**$13.59**

Coming Soon - Our new 800 Number (except Calif.) 800-344-4111

HUNTINGTON COMPUTING, Dept. CC5
2020 Charles Street
Post Office Box 787
Corcoran, California 93212
Order by Phone (209) 992-5411

VISA MasterCharge

We take MasterCard or VISA (Include card # and expiration date). California residents add 6% tax. Include $2.00 for postage. Foreign extra. Send for free catalog.

Solve It, continued...

The Program:

```
10 PRINT "THE WATER BUCKET "
20 INPUT "ENTER THE BUCKET CAPACITY    (QUARTS):"C
30 INPUT "ENTER THE AMOUNT OF WATER TO POUR IN:"A
40 GR
50 COLOR=15                    :REM COLOR OF BUCKET
70    VLIN 39-C,39 AT 14       :REM LEFT SIDE OF BUCKET
80    VLIN 39-C,39 AT 25       :REM RIGHT SIDE OF BUCKET
90    HLIN 14,25 AT 39         :REM BOTTOM OF BUCKET
100 COLOR =4                   :REM COLOR OF WATER
110   FOR I = 1 TO A           :REM POUR IN WATER
120     HLIN 15,24 AT 39-I     :REM ONE QUART AT A TIME
130   NEXT I
140 END
```

Remarks:

1) There is nothing in this program to prohibit the amount of water (A) from being larger than the capacity of the bucket (C). The program will run just as well in this situation but it will look as though someone left the water outside overnight in Wisconsin in January. Of course, this can be prohibited by simply adding a statement: 35 IF A > C THEN PRINT "TOO LARGE" : GOTO 30

2) Also the program as written does not protect the user from a fatal error—entering too large a bucket for the screen. This can be protected against in the above program by adding: 25 IF C > 39 THEN PRINT "TOO LARGE":GOTO 20

3) These types of safeguards are examples of good programming habits that protect the user from getting unexpected results or accidentally terminating the program.

Additional Questions:

Most computer problems easily lend themselves to further expansion and/or modification. Below are a few suggestions for The Water Bucket problem.

1) Add the ability to empty the water out of the bucket after it has been filled.

```
140 INPUT "PRESS RETURN TO EMPTY THE BUCKET ";A$
150 COLOR = 0                  :REM SET COLOR TO BLACK
160   FOR I=A TO 1 STEP -1     :REM BEGIN TAKING OUT WATER
170     HLIN 15,24 AT 39-I     :REM ERASE ONE QUART
180   NEXT I
190 END
```

Notice that FOR/NEXT loops can also count backwards by stepping by -1 each time. The STEP portion of the loop is optional and without it the computer assumes that the step size is +1.

2) Draw two buckets on the screen, fill one, and then empty it into the second bucket.

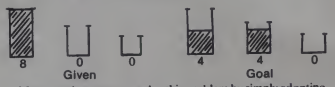
3) Draw two buckets of different size, fill the largest one with water, and empty as much as possible into the smaller bucket.

4) Experiment with different shapes for the containers.

Lesson #7 (Intermediate Students)

The Setting:

A popular puzzle which has amused and bemused people as far back as the 15th and 16th centuries is the Water Jug Problem. A typical version of the problem begins with a jug filled to the top with water. The amount is not important, but for the sake of discussion, let's assume the jug holds eight quarts. Two other empty jugs with capacities of perhaps five quarts and three quarts respectively are also available. The problem is to find a way to divide the water in half—four quarts to a jug. The jugs are unmarked and there are no measuring devices available. How can this job be done? This problem is represented by drawing the three jugs in their Given and Goal states.

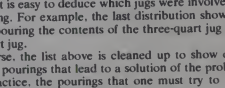


Most people attempt to solve this problem by simply adopting a method of trial and error. To keep track of the water distributions after each pouring, a chart something like the following might be constructed.

Pouring #	8-quart jug	5-quart jug	3-quart jug
0	8	0	0
1	3	5	0
2	3	2	3
3	6	2	0
4	6	0	2
5	1	5	2
6	1	4	3
7	4	4	0

The numbers in the jug capacity columns represent the amount of water in the jug at the present time. By looking back one row, it is easy to deduce which jugs were involved in the last pouring. For example, the last distribution shown is the result of pouring the contents of the three-quart jug into the eight-quart jug.

Of course, the list above is cleaned up to show only the necessary pourings that lead to a solution of the problem. In actual practice, the pourings that one must try to find the solution branch out like a tree.



The ultimate goal, which will be carried out in the advanced problem, is to construct a procedure which will find a solution, if indeed one exists.

This problem will be broken down into two parts. The first part, which is appropriate for intermediate students, is presented first.

The Problem:

Write a computer program which will begin with any amount of water initially distributed between three jugs of eight-, five-, and three-quart capacity respectively, and will then find all possible distributions of water that can result from one pouring. Use the notation X Y Z to represent the water levels in the three jugs. For example, if X Y Z = 8 0 0, as in the initial problem, the possible distributions of water that could result from one pouring are 3 5 0 and 5 0 3.

The Discussion:

As with most problems, finding a good way to represent it is extremely important. A careful choice can make the work of finding a solution considerably easier. We begin with X Y Z

Just A Few Left!

Brand new books at up to 40% discount!

Postage costs up. Handling costs up. Prices up. Discounts down. Add it all up and we find it's no longer profitable to handle books of other publishers.

We feel that by applying all our resources and energy to our own book publishing division, we'll be able to serve our customers better than by carrying books of many publishers.

However, right now we still have a few books left. Since we have to make room for our own stocks, we're letting these go at our cost, generally 30 to 40 percent less than the retail price. But act quickly. In most cases we have only 20 or 30 books left, yet over 200,000 people will see this advertisement.

To order one or more books, send payment plus $3.00 shipping and handling (for any size order) to Creative Computing, P.O.Box 789-M, Morristown, NJ 07960. Or send your Visa, MasterCard or American Express card number and expiration date. If you don't want to wait, call our toll-free number **800-631-8112** (in NJ, 201-540-0445).

creative computing

Here are the books currently available.

Problems For Computer Solution

Gruenberg & Jaffray. A collection of 92 problems in engineering, business, social science and mathematics. The problems are presented in depth and cover a wide range of difficulty. Oriented to Fortran but good for any language. A classic 401 pp. ~~$12.50~~ [7A].

Only 91 left — $10.17

Game Playing With Computers (Revised 2nd Edition)

Donald D. Spencer. Now you can sharpen programming skills through a relaxed and radically different approach. Including 70 games, puzzles, and mathematical recreations for a digital computer. It's fully illustrated and includes more than 25 game-playing programs in FORTRAN or BASIC, complete with descriptions, flowcharts, and output. Brand-new "how to" information for applying mathematical concepts to game playing with a computer. 320 pp. ~~$10.95~~ [10G]

Only 48 left — $10.17

The Thinking Computer: Mind Inside Matter

Bertram Raphael. Artificial intelligence, or AI, is the branch of computer science concerned with making computers "smarter." With a minimum ot technical jargon, this book discusses the capabilities ot modern digital computers and how they are being used in contemporary AI research. Discusses the progress of AI, the goals, and the variety of current approaches to making the computer more intelligent. ~~$6.95~~ [7X]

Only 30 left — $6.95

Small Computer Systems Handbook

Sol Libes. The emphasis throughout this primer is on the important practical knowledge that the home computer user should have to be able to intelligently purchase, assemble, and interconnect components, and to program the microcomputer. Only a minimal knowledge of electronics is required to use this book. 196 pp. ~~$8.45~~ [11D]

Only 22 left — $7.82

Cross-Sums

Maltby & Fulbrook. The answers are numbers! Vertical columns must total the same as horizontal rows. It's a new puzzle game — constructed by Richard Maltby, Jr., master puzzle-maker for *Harper's* and *New York Magazine*s. 30 puzzles including Nursery Rhymes, Children's Hour, Golf, Movies, Famous Dates, and more. 108 pp. ~~$4.95~~ [10L]

Geometric Cross-Sums

Maltby & Fulbrook. Another puzzle game. This one has 30 puzzles ranging in difficulty from easy to fiendish. Each diagram takes a special shape — Triangles Fun, The Magic Hexagon, Shapes Within Shapes, Literature in 3-D., and more! 108 pp. ~~$4.95~~ [10M]

Only 40 of each — $1.00

Beginner's Guide To Microprocessors

Charles M. Gilmore. No background in electronics is necessary to understand this book. It was written for those with no prior knowledge whatsoever ot microprocessors or personal computing. Gilmore takes you from what a microprocessor is, how it works and what it's used for to how they're programmed to perform desired functions in microwave ovens, TV games, calculators, etc. 175 pp. ~~$5.95~~ [7U].

Only 77 left — $3.57

The First Book of Microcomputers

Robert Moody. Tells what personal computers are and what you can do with them in a light-entertaining style. Starts with the basics and then covers the technical aspects such as how a personal computer is constructed and how it works. Includes such things as home protection, keeping track of budgets and bills, game playing, inventory management and tax calculations. 139 pp. ~~$4.95~~ [10T]

Only 31 left — $3.25

Some Common BASIC Programs

Poole & Borchars. This book combines a diversity of practical algorithms in one book : matrix multiplication, regression analysis, principal on a loan, integration by Simpson's rule, roots of equations, chi-square test, and many more. All the programs are written in a restricted BASIC suitable for most microcomputer BASIC packages, and have been tested and debugged by the authors. ~~$9.50~~ [7M]

Only 12 left — $6.40

BASIC With Business Applications

Richard W. Lott. This book focuses on the BASIC language and its application to specific business problems. Part one introduces the BASIC language and the concept of logical flowcharting. Part two presents problems and possible solutions. Topics include: interest rate calculations, break-even analysis, loan rates, and depreciation. This book is a great aid to the beginner wanting to learn BASIC without having a technical or scientific background. 284 pp. ~~$10.50~~ [10Z]

Only 18 left — $7.95

Payroll with Cost Accounting In BASIC

Lon Poole. Includes program listings with remarks, descriptions, discussion of the principles of each program, file layouts, and a complete user's manual with step-by-step instructions, flow charts and sample reports with CRT displays. 356 pp. ~~$15.95~~ [10W]

Only 37 left — $10.00

Consumers Guide to Personal Computing and Microcomputers

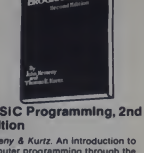
Freiberger and Chew. Here are two valuable books in one: an introduction to the principles of microcomputers that assumes no previous knowledge on the reader's part, and a review of 64 microcomputer products from over 50 manufacturers. Also, extensive illustrations and best-buy tips for each type of microcomputer product. 176 pp. ~~$7.95~~ [10U]

Only 18 left — $6.95

Build Your Own Working Robot

David Hansarman. Complete plans, schematics and logic circuits for building a robot. Not a project for novices, this robot is a sophisticated experiment in cybernetics. You build him in phases and watch his capabilities increase and his personality develop. Phase I is leash led, Phase II has a basic brain, while Phase III responds and makes decisions. 238 pp. ~~$6.95~~ [9M].

Only 70 left — $3.92



BASIC Programming, 2nd Edition

Kemeny & Kurtz. An introduction to computer programming through the language of BASIC. The authors include in-depth discussions of many applications including files and text processing. 150 pp. ~~$10.95~~ [7E]

Only 13 left — $8.00

Solve It, continued...

quarts of water distributed in the eight-, five-, and three-quart capacity jugs respectively. There are at most six possible new distributions that can result for three jugs. These are derived by picking any one of the three possible jugs for the source of the water (source jug) and pouring its water into either one of the remaining two jugs (sink jugs). For example, if we begin with a distribution of 4 2 2 then the six possible resulting distributions after one pouring would be:

These numbers were arrived at by beginning with the jug on the left as the source and pouring into the sink jugs in order from left to right. In each transfer, one of two things happens. Either there is enough room in the sink jug for all the water to be poured into it, or some must be left behind in the source jug. Most of the work in this program is figuring out the details for each transfer and setting up the proper decisions which will produce the correct distribution of water. The six cases that must be considered for this problem are:

Pourings:	Source Jug	Sink Jugs
	1	2,3
	2	1,3
	3	1,2

The Program:

```
100 PRINT "INTERMEDIATE JUG PROBLEM"
120 PRINT "ENTER THE INITIAL WATER LEVEL IN THE THREE JUGS."
130 INPUT " 8-QUART JUG ";A(1)
140 INPUT " 5-QUART JUG ";A(2)
150 INPUT " 3-QUART JUG ";A(3)
160 PRINT
170 PRINT "HERE ARE THE POSSIBLE LEVELS AFTER ONE POURING"
180 REM *** A(1) IS THE SOURCE
190    IF A(1)=0 THEN 280       \ REM SOURCE IS EMPTY
200 REM *** POUR FROM JUG 1 TO JUG 2
210    IF A(2)=5 THEN 240       \ REM DESTINATION IS FULL
220       X=A(1)+A(2)           \ REM ADD JUG 1 AND JUG 2
230    IF X<5 THEN PRINT 0;X;A(3) ELSE PRINT X-5;5;A(3)
240 REM *** POUR FROM JUG 1 TO JUG 3
250    IF A(3)=3 THEN 280       \ REM DESTINATION IS FULL
260       X=A(1)+A(3)           \ REM ADD JUG 1 TO JUG 3
270    IF X<3 THEN PRINT 0;A(2);X ELSE PRINT X-3;A(2);3
280 REM *** A(2) IS THE SOURCE
290    IF A(2)=0 THEN 380
300 REM *** POUR FROM JUG 2 TO JUG 1
310    IF A(1)=8 THEN 340       \ REM DESTINATION IS FULL
320       X=A(1)+A(2)           \ REM ADD JUG 2 TO JUG 1
330       IF X<8 THEN PRINT X;0;A(3) ELSE PRINT 8;X-8;A(3)
340 REM *** POUR FROM JUG 2 TO JUG 3
350    IF A(3)=3 THEN 380       \ REM DESTINATION IS FULL
360       X=A(2)+A(3)           \ REM ADD JUG 2 TO JUG 3
370    IF X<3 THEN PRINT A(1);0;X ELSE PRINT A(1);X-3;3
380 REM *** A(3) IS THE SURCE
390    IF A(3)=0 THEN 480       \ REM SOURCE IS EMPTY
400 REM *** POUR FROM JUG 3 TO JUG 1
410    IF A(1)=8 THEN 440       \ REM DESTINATION IS EMPTY
420       X=A(1)+A(3)           \ REM ADD JUG 3 TO JUG 1
430    IF X<8 THEN PRINT X;A(2);0 ELSE PRINT 8;A(2);X-8
440 REM *** POUR FROM JUG 3 TO JUG 2
450    IF A(2)=5 THEN 480       \ REM DESTINATION IS FULL
460       X = A(2)+A(3)         \ REM ADD JUG 3 TO JUG 2
470    IF X<5 THEN PRINT A(1);X;0 ELSE PRINT A(1);5;X-5
480 END
```

```
READY
RUN

THE INTERMEDIATE WATER JUG PROBLEM

ENTER THE INITIAL WATER LEVEL IN THE THREE JUGS.
 8-QUART JUG 8
 5-QUART JUG 0
 3-QUART JUG 0

HERE ARE THE POSSIBLE LEVELS AFTER ONE POURING
 3 5 0
 5 0 3
READY
RUN

THE INTERMEDIATE WATER JUG PROBLEM

ENTER THE INITIAL WATER LEVEL IN THE THREE JUGS.
 8-QUART JUG 4
 5-QUART JUG 3
 3-QUART JUG 2

HERE ARE THE POSSIBLE LEVELS AFTER ONE POURING
 2 5 2
 3 3 3
 7 0 2
 4 2 3
 6 3 0
 4 5 0
READY
RUN

THE INTERMEDIATE WATER JUG PROBLEM

ENTER THE INITIAL WATER LEVEL IN THE THREE JUGS.
 8-QUART JUG 5
 5-QUART JUG 5
 3-QUART JUG 3

HERE ARE THE POSSIBLE LEVELS AFTER ONE POURING
 8 2 3
 8 5 0
READY
```

Remarks:

The program listed here was written in North Star Basic. To make it run correctly in Applesoft Basic a few simple changes are necessary.

1) In all INPUT statements the comma (,) must be changed to a semicolon (;). (See lines 130-150)

2) Applesoft does not have an ELSE statement. However, a simple modification where this occurs will produce the same effect. For example. Line 230 must be changed and 235 added:

```
230 IF X< 5 THEN PRINT 0;X;A(3) : GOTO 240
235 PRINT X-5;5;A(3)
```

Similar changes must be made in lines 270,330,370,430,470.

Lesson #7 (Advanced Students)
The Setting:

The water jug problem, introduced in the intermediate lesson, offers the advanced student a significant problem when expressed in its full generality. Rather than write a program that solves a specific water jug problem with a fixed number of jugs of specified capacity, it would be much more interesting to write a general program that will find all possible distributions of water starting from any given initial distribution of water placed in any number of different size jugs. This is the setting in which the advanced program will be introduced.

The Problem:

Write a program which will solve the general water jug problem. The user must be able to enter the number of water jugs in use, their capacity, and the initial amount of water in each. The program should then list all possible distributions of water that can be achieved by pouring water from one jug to another. Also, the program should indicate how each distribution can be reached from the initial distribution.

The Discussion:

At first glance, this appears to be a difficult problem, so we will tackle it one step at a time. There are several subgoals in this problem.

Subgoal 1 — PRINT THE DISTRIBUTION. A procedure to print out any distribution.

Subgoal 2 — POUR WATER. A procedure to perform the next scheduled pouring of water.

Subgoal 3 — CHECK FOR DUPLICATION. A procedure

Solve it continued...

to check the current distribution against the master list for possible duplication.

Subgoal 4 — ADD THE DISTRIBUTION. A procedure to add a new distribution to the master list and note its predecessor.

Subgoal 5 — COPY THE DISTRIBUTION. A procedure to make a copy of the current distribution.

A successful program combines these procedures into an integrated program.

The Algorithm:

1) Enter N. (the number of jugs)
Enter A (I.I), (the initial amount in each jug (I=1 to N))
Enter B(I), (the capacity of each jug (I=1 to N))
2) COPY THE DISTRIBUTION
3) PRINT THE DISTRIBUTION
4) POUR WATER
5) CHECK FOR DUPLICATION
6) If no duplication. then ADD THE DISTRIBUTION
7) If nothing new is added after all possible pourings have been tried with the last distribution on the list, then END.
8) Continue at 2.

The Program:

```
100 PRINT "WATER JUG PROBLEM "
110 PRINT
120 INPUT "ENTER THE NUMBER OF JUGS  ",N
130 DIM A(99,N), P(99)
140 PRINT "FOR EACH JUG ENTER HOW MUCH WATER IS INITIALLY "
150 PRINT "PRESENT IN GALLONS, AND HOW MUCH THE JUG CAN HOLD."
160 PRINT "JUG #",TAB(10),"INITIAL AMOUNT ",TAB(30),"CAPACITY "
170 FOR I=1 TO N
180 PRINT I,TAB(10),\INPUT1 A(1,I)\PRINT TAB(30),\INPUT B(I)
190 NEXT I
200 PRINT
210 PRINT "INDEX",TAB(10),"JUG HOLDINGS",TAB(30),"PREVIOUS INDEX"
220 L=1 \ P=1 \ P(1)=0
230 GOSUB 540
240 GOSUB 590
250 REM **** BEOIN TRANSFERINO WATER ****
260     FOR I=1 TO N
270       IF C(I)=0 THEN 500
280         FOR J=1 TO N
290           IF I=J THEN 490
300           IF A(P,J)=B(J) THEN 490
310             GOSUB 540
320           IF A(P,I)+A(P,J)>=B(J) THEN 370
330 REM **** TRANFER FULL JUO *****
340           C(J)=A(P,J)+A(P,I)
350           C(I)=0
360           OOTO 400
370 REM **** TRANSFER PART OF A JUO ****
380           C(J)=B(J)
390           C(I)=A(P,I)+A(P,J)-B(J)
400 REM **** CHECK FOR DUPLICATION OF NODES ****
410         FOR S=1 TO L
420           FOR  R =1 TO N
430             IF C(R)<>A(S,R) THEN EXIT 460
440           NEXT R
450           EXIT 490
460         NEXT S
470 REM **** NEW NODE FOUND ****
480           L=L+1 \ GOSUB 630 \ GOSUB 590
490     NEXT J
500 NEXT I
510     P=P+1
520     IF P>L THEN END
530     GOSUB 540 \ GOTO 250
540 REM **** SUBROUTINE TO MAKE COPY OF A(P, ) ****
550   FOR S=1 TO N
560     C(S)=A(P,S)
570   NEXT S
580   RETURN
590 REM **** SUBROUTINE TO PRINT OUT WATER DISTRIBUTION ****
600     PRINT L,TAB(10),
610     FOR S=1 TO N \ PRINT C(S),\NEXT S \ PRINT TAB(30),P(L)
620     RETURN
630 REM **** SUBROUTINE TO ADD NODE TO LIST ****
640     FOR S=1 TO N
650       A(L,S)=C(S)
660     NEXT S
670       P(L)=P
680     RETURN
```


♠ **CompuBridge®** ♢
Contract Bridge Series
♡ **For Apple II** ♣
(No special hardware needed)

Elementary 32K Cassette $19.95
Complete 32K Cassette $29.95
Complete 48K Diskette $39.95
Programmed lessons plus QUIZ-MAKER which deals random hands, then checks your answers and quizzes you or supplies the answer.

Defender's Play—Opening Leads
32K Cassette $29.95
48K Diskette $39.95
Instruction plus random hands for unlimited quizzes.

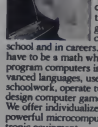
C.C. Wei's Precision Bidding
32K Cassette $29.95
48K Diskette $39.95
Instruction plus random hands for unlimited quizzes on the popular Precision Bidding system.

Available from your Apple Dealer or CompuBridge Division, Barclay Bridge, Port Chester, N.Y. 10573.

Please send _____
for ___ 32K ___ 48K
Check enclosed or charge to
VISA MC Card No. _____
Name _____
Address _____
_____
N.Y. Residents add Sales Tax

CIRCLE 117 ON READER SERVICE CARD

COMPUTER CAMP EAST
"I swam, I hiked, I ran a computer."
Co-ed pre-teen and teens 10-17



Campers will have sports, crafts, games —and a brighter future— at Computer Camp East. The computer skills they'll learn can give the a keen competitive edge in school and in careers. A student doesn't have to be a math whiz to learn how to program computers in BASIC and advanced languages, use computers for schoolwork, operate turtle robots and design computer games.
We offer individualized instruction using powerful microcomputers and other electronic equipment.
Two-week sessions begin June 28, July 13, July 27, and August 10.
Enrollment is limited. Act today. Call (203) 871-9227 or write Computer Camp East, Office/6 Forest View Drive, Vernon, CT 06066.

Residential Camp in East Haddam, CT; day programs in Cambridge, Weston and Cape Cod, MA; and W. Hartford, CT.

CIRCLE 135 ON READER SERVICE CARD

Solve It, continued...

```
READY
RUN

WATER JUG PROBLEM

ENTER THE NUMBER OF JUGS  3
FOR EACH JUG ENTER HOW MUCH WATER IS INITIALLY
PRESENT IN GALLONS. AND HOW MUCH THE JUG CAN HOLD.
JUG #      INITIAL AMOUNT       CAPACITY
 1          ?8                   ?8
 2          ?0                   ?5
 3          ?0                   ?3

INDEX      JUG HOLDINGS         PREVIOUS INDEX
 1          8 0 0                0
 2          3 5 0                1
 3          5 0 3                1
 4          0 5 3                2
 5          3 2 3                2
 6          5 3 0                3
 7          6 2 0                5
 8          2 3 3                6
 9          6 0 2                7
 10         2 5 1                8
 11         1 5 2                9
 12         7 0 1                10
 13         1 4 3                11
 14         7 1 0                12
 15         4 4 0                13
 16         4 1 3                14
READY

RUN

WATER JUG PROBLEM

ENTER THE NUMBER OF JUGS  3
FOR EACH JUG ENTER HOW MUCH WATER IS INITIALLY
PRESENT IN GALLONS. AND HOW MUCH THE JUG CAN HOLD.
JUG #      INITIAL AMOUNT       CAPACITY
 1          ?0                   ?19
 2          ?13                  ?13
 3          ?7                   ?7

INDEX      JUG HOLDINGS         PREVIOUS INDEX
 1          0 13 7               0
 2          13 0 7               1
 3          7 13 0               1
 4          19 0 1               2
 5          13 7 0               2
 6          19 1 0               3
 7          7 6 7                3
 8          6 13 1               4
 9          6 7 7                5
 10         12 1 7               6
 11         14 6 0               7
 12         12 8 0               10
 13         14 0 6               11
 14         5 8 7                12
 15         1 13 6               13
 16         5 13 2               14
 17         1 12 7               15
 18         18 0 2               16
 19         8 12 0               17
 20         18 2 0               18
 21         8 5 7                19
 22         11 2 7               20
 23         15 5 0               21
 24         11 9 0               22
 25         15 0 5               23
 26         4 9 7                24
 27         2 13 5               25
 28         4 13 3               26
 29         2 11 7               27
 30         17 0 3               28
 31         9 11 0               29
 32         17 3 0               30
 33         9 4 7                31
 34         10 3 7               32
 35         16 4 0               33
 36         10 10 0              34
 37         16 0 4               35
 38         3 10 7               36
 39         3 13 4               37
READY
```

Remarks:

This program was also written in North Star Basic and a few changes must be made if it is to be run in Applesoft.

1) The usual punctuation mark changes from a comma (,) to a semicolon (;) in all INPUT and PRINT statements.

2) Change the EXIT 460 part of line 430 to GOTO 460. Also change line 450 GOTO 490.

3) Line 160 and 180 should be changed to read:

```
160 PRINT "JUG #";TAB(10);"INITIAL AMOUNT, CAPACITY"
180 PRINT I;TAB(15);INPUT A(I,1),B(I)
```

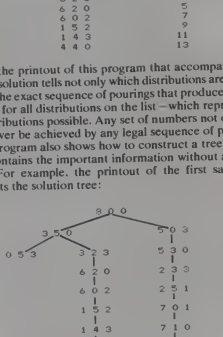
Postscript:

The printout for each sample run tells the whole story for each problem. The INDEX on the left lists in order all unique distributions of water in the jugs (JUG HOLDINGS). The index on the right (PREVIOUS INDEX) indicates from what previous distribution it originated. This would be important to know whenever it was necessary to reconstruct the precise sequence of pourings that leads to a given distribution. For example, to trace how the distribution 4 4 0 was derived in the first sample run, simply look to the right under the PREVIOUS INDEX to find the number 13, which corresponds to the distribution 1 4 3. This is called the ancestor of 4 4 0. Continue in the same way, reconstructing each ancestor, until you arrive back to the original distribution of 8 0 0. The result will be a subset of the original list.

```
INDEX      JUG HOLDINGS         PREVIOUS INDEX
 1          8 0 0                0
 2          3 5 0                1
 5          3 2 3                2
 7          6 2 0                5
 9          6 0 2                7
 11         1 5 2                9
 13         1 4 3                11
 15         4 4 0                13
```

Thus, the printout of this program that accompanies each problem solution tells not only which distributions are possible, but also the exact sequence of pourings that produces them. It does this for all distributions on the list—which represent the only distributions possible. Any set of numbers not on the list could never be achieved by any legal sequence of pourings.

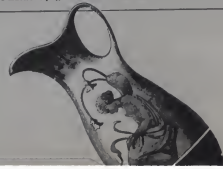
This program also shows how to construct a tree structure which contains the important information without any duplication. For example, the printout of the first sample run represents the solution tree:



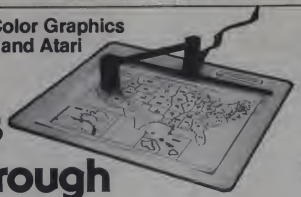
References

(1) Bellman, Cooke, Luckette. *Algorithms, Graphs, And Computers*. Academic Press, New York, 1970.

(2) La Frenz, Johnson. *Computer Assisted Mathematics Program-Algebra*. Teacher's Edition, page 4. Scott Foresman & Co. 1969.



High-Resolution Color Graphics for the Apple and Atari



Graphics Breakthrough

How many programs have you written that would benefit from animated high-resolution graphics? Probably several. It is this kind of dramatic graphics that distinguish outstanding programs from ordinary ones. But if you've ever agonized for hours or days just to get one image perfected, you're probably not anxious to do it again. Now there's a better way.

New Graphics Entry System

Today there is a new graphics system available that is not only amazingly user-oriented but surprisingly economical. Called VersaWriter, it starts with an ingeniously simple entry board consisting of a 14" X 12" high impact plastic bed with a tough clear plastic overlay sheet. The original drawing or diagram is fastened with masking tape to the plastic bed and then covered with the clear sheet. Instead of using a light pen or complicated electronic X-Y head, the VersaWriter uses a double jointed arm attached to the top of the entry board at one end and a magnifying lens with crosshairs at the other end. The VersaWriter resembles a draftsman's pantograph on a smaller scale.

At each joint in the arm of the VersaWriter is a potentiometer. A cable from these pontentiometers connects to the paddle input of the computer. No special interface electronics or board is needed. Since the arm of the VersaWriter bends only in one direction, each point on the plotting head corresponds to a unique set of resistances on the potentiometers. All that's needed now is software to translate these resistances into usable screen coordinates.

Exceptionally powerful software

It is in the software where VersaWriter really stands out. VersaWriter comes with two full disks of user-oriented software. First it has sets of "low level" commands for entering, creating and copying drawings and diagrams. Secondly, it has extensive sets of application routines for moving, enlarging, rotating, coloring or animating drawings that the user has created.

Of course the basic commands let you enter a drawing freehand or by tracing it. Want a wider "brush stroke"? Six widths are available. Drawings can be independently scaled in both the vertical and horizontal directions. An enclosed shape may be filled in with any of 212 colors. No, that is not a misprint—by the same technique that a printing press can create hundreds of colors from three primary ones, so can Versa-Writer.

Here a shape (the letter A) is being scanned. After putting it in a shape table it may be used in other programs.

From the shape table, a shape (the letter A) may be enlarged, shrunk, rotated, colored or moved about the screen.

Create Animation for Other Programs

The shapes you create with VersaWriter can be used and manipulated with ease in other programs. Up to 255 shapes can be entered into a shape table. These shapes may then be placed on the screen in any position or may be overlaid on a full or partial screen image. Animation is produced easily by moving about a portion of the image created by VersaWriter. For example, by alternating between two images of an airplane propeller it will appear to be spinning.

Other VersaWriter software includes text-writer with which text can be added to graphics. Upper and lower case, choice of color, text size, direction and starting point all may be specified.

The Area/Distance program lets you calculate distances (or perimeters) by entering a scale and tracing a shape or map route with the drawing arm. Areas of figures, open and irregular, can be similarly calculated.

The software also includes sets of electronic and computer logic shapes. In addition, an entire disk of dramatic demonstration graphics is included. These twelve full-screen graphics run the gamut from a fully labeled cross section of a human skull to colored maps to animated cartoons to an electronics schematic.

Free Software Updates

You may have read a review of VersaWriter that indicated that the color fill routine was slow. It was. But not anymore. Several new routines and improvements were added to the VersaWriter software since its introduction. All customers of Peripherals Plus received these changes free.

As new updates are developed, Peripherals Plus will furnish them free to all customers FOREVER. We make this unique guarantee because it is in our best interest to have you make the best use of your computer. We're convinced that if other people see your VersaWriter in use, they'll want one too.

Best Performance and Price

At Peripherals Plus, we evaluated every graphics entry device. We wanted to handle the best one regardless of price. VersaWriter has the best performance bar none. Surprisingly it also has the lowest price, just $249.00 for the Apple version.

VersaWriter requires an Apple II with Applesoft in ROM (or an Apple II Plus), disk, and 48K of memory. The Atari version requires an Atari 800, disk and at least 32K. It is priced at $300.

VersaWriter comes complete with two disks of software, a comprehensive instruction manual, a 90-day limited warranty and Peripherals Plus unique guarantee of software updates forever.

Try VersaWriter for 30 days. If you are not completely satisfied we'll give you a prompt and courteous refund of the full price plus shipping both ways.

To order, specify Apple or Atari version, send payment plus $3.00 shipping and handling to Peripherals Plus, 39 East Hanover Ave., Morris Plains, NJ 07950. (New Jersey residents please add 5% Sales tax.) Credit card customers should include card number and expiration date of Visa, MasterCard or American Express card. Credit card customers may also call toll-free 800-631-8112 (in NJ 201-540-0445).

For spectacular graphics on your computer, order VersaWriter today.

Graphics Systems

Versa Writer	**$249.00**
Kurta Graphics Tablet	**695.00**
Summagraphics Digitizer	**745.00**
Houston Instruments HI Pad	**795.00**
Apple Graphics Tablet	**795.00**

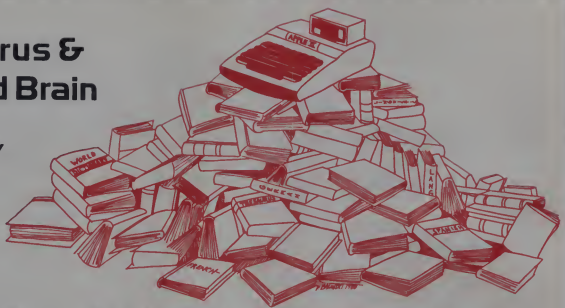
Peripherals Plus

39 E. Hanover Ave.
Morris Plains, NJ 07950
Toll-free **800-631-8112**
(In NJ 201-540-0445)

Apple is the registered trademark of Apple Computer Inc

Applesaurus & The World Brain

Derek Kelly



I had one overriding reason for wanting my own, my personal, computer. The most characteristic and persistent intuition of my mind is the unity-in-the-variety of knowledge and experience. I wanted a computer — rather, I *needed* one — because I one day wanted to be able to construct a Thesaurus — a synopsis of linguistic meanings — of all the world's languages to use as a basis for exploring linguistic interconnections on a world-wide scale. I also wanted to learn how to do my own programming so that I could transform my intuitions into operations myself. Well, needless to say, my Apple II and I are not yet ready to undertake such a job. For one thing, I would need around 50 to 100 megabytes of storage capacity, and lots of leisure time, neither of which are now available.

In the meantime, however, I can follow the maxim, "Do more with less." While I wait for free time and an affordable memory system, I can still use my 32K Apple with only a cassette to develop at least the contours of the kind of program and data base I will eventually need to have. My modest aim in this article is to outline the program and the data base involved in doing what is called "Structural Semantics." The moral of the story is that you don't need a megabuck system to carry out some interesting research.

My data base is drawn entirely from the Synopsis of Categories in the 1978 edition of *Roget's International Thesaurus*. These categories are organized into an hierarchy of more and of less inclusive words which can conveniently be referred to here as a system of files, records and fields. Roget's *Thesaurus* has played a major inspirational role in the development of information retrieval systems because it organizes words semantically, into clusters of semantic domains, which is exactly what needs to be done if translation programs are to work satisfactorily, and if any data base is to be useful.

I want to show how that synopsis of semantic categories can be meaningfully used even on a small personal computer. I want to discuss also the problem of organization of words and ideas generally by touching on the idea of a "World Brain." H. G. Wells, who first brought up this idea, though he had many anticipations before him, brought it up because he was concerned with the problem of the ineffectiveness of knowledge in practical affairs. I think that Roget's *Thesaurus* is a major source of the organizational structure of the world brain — so the program which uses the synopsis of categories from the *Thesaurus* may be regarded as an implementation of the idea of a world brain. Rather than being something nebulous and inaccessible, the world brain, in a very short & inadequate version, can be implemented on a 16K personal computer. And that is quite an interesting proposal, if you ask me.

I wanted to be able to construct a Thesaurus — a synopsis of linguistic meanings — of all the world's languages to explore linguistic interconnections on a world-wide scale.

Applesaurus Data Base

Millions of people use millions of copies of Roget's *Thesaurus*, yet few people are really acquainted either with Roget or his work, so a few comments on both are in order.

Peter Mark Roget (1779-1869) was an extraordinary man with an untiring life-purpose: to accumulate knowledge and to organize and classify that knowledge. Roget would have felt right at home in the present day. I can well imagine him now working away at his Apple in the sky to perfect his *Thesaurus*; for among his many interests and accomplishments, such as helping to found the University of London, or develop a slide rule, or construct a pocket chess set, or working on what 150 years later we call "pollution control," Roget also had a passionate interest in constructing a calculating machine. What he wanted was a machine that could help him study words and ideas. He was fascinated by mathematical combinations and permutations, and felt that they could be applied to semantic problems. For example, some words combine (e.g. by negation) the opposing terms. For example, past and future are opposites that are combined by present; or middle combines beginning, and end, and so on.

For much of his life, Roget was concerned with the classification of words & meanings. He lived in an age of great classifications and classifiers: Cuvier, Linnaeus, Mendelejeff (of the Periodic Table), Darwin, Mill, Bentham and many others. From the age of 26 (in 1805), Roget was interested in structural semantics, in drawing up and ordering long lists of words.

The classification of ideas — and of data generally — is the heart of information retrieval. A thesaurus is not just a dictionary — a serial list of

Derek A. Kelly, P.O. Box 755, Estes Park, CO 80517.

DATA PROCESSING SUPPLIES SUPPLIES SUPPLIES

3M Authorized Distributor, Scotch Brand Information Recording Products
Disc Cartridges, Diskettes, Disc Packs
Magnetic Tape, Digital Cassettes, Data Cartridges

National Data Binders, Printout Filing Systems
Magnetic Media Filing Systems

Diablo Hytype II & Hytype I
Print Wheels & Ribbon Cartridges

Qume. Ribbon Cartridges
Print Wheels

Alpha Continuous Business Forms
Programmer Coding Forms, Flow Chart Pads
Printout Filing Systems

Avery Label Continuous Data Processing Tabulabels
Media Labels for Diskette, Cassette

Data-MATE Printer & CRT Stands

media-mate Storage Cabinets

NEC Spinwriter Ribbon Cartridges
Print Thimbles™

AGT Print Wheels

IBM. Genuine IBM Diskettes

CALL OR WRITE FOR A FREE CATALOG

ALPHA COMPUTING SUPPLY, INC.
9625 Mason Avenue, Chatsworth, California 91311
(213) 882-8818

CIRCLE 107 ON READER SERVICE CARD

LOOK!!!
AVANT-GARDE CREATIONS has SOFTWARE:

EDUCATION
ART/DESIGN
GAMES
BUSINESS
UTILITIES
SELF TRANSFORMATION

LOOK AGAIN!!!

We have the following and MORE!:
5 Great Games! Animal Bingo, Jungle Safari, Space Defense, Sky Watcher, Air Traffic Controller $29.95 (or $9.95 each)
5 More Great Games! Deep Sea Treasure, Mystery Code, Depth Charge, The Mine Fields of Normalcy, Turn 'Em Loose $29.95 (or $9.95 each)
The Mailing Label & Filing System Filing, label-making, binary sort, dynamic sorting, directory, quick-find, more! $24.95
Sentence Diagramming Educational, grades 6-12 $19.95
Action Sounds & Hi-Res Scrolling Designed to give your program the excitement of **action & sound** $15.95
Super Draw & Write Fonts, drawing, and useful utilities $15.95

Super Shape Draw! The best system yet, it works! ...creates shape tables like a dream... $19.95
The Creativity Package Draw, write poetry, music $19.95
"...impressive...satisfying...interesting...fun!" Peelings (The Magazine of Software Reviews)
"Truly different...unique...the program is an enjoyable one...cute...very interesting...new...nice...a good value!" Apple Orchard (Winter)

Demo Disk I Some of our best stuff $9.95
Demo Disk II More of our best $9.95

All of our software is written in Applesoft*, 48K, disk

AVANT-GARDE CREATIONS
P.O. Box 30160
Eugene, OR 97403 Dept. CC
(503) 345-3043
(12pm-6pm 7 days a week)

DEALER INQUIRIES INVITED
VISA MASTERCARD

*Apple is a trademark of Apple Computer, Inc.

CIRCLE 118 ON READER SERVICE CARD

New! APPLE-JACK
THE GRAPHICS & GAMES PEOPLE

SUPER STARBASE GUNNER

THE DESIGNER

BOTH FOR **$29.95** Disk & Manuals

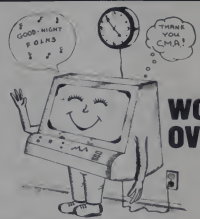
THE SSG — This fast 3-D HIRES simulations clever and complex challenges, shooting into the screen, into 3-D space, where the target is mathematically many feet behind the screen surface. How about computer intelligent targets that shoot back, use strategy and learn. Ten levels of play, sound effects, colorful explosions and real time graphics. A real space battle simulation.

THE DESIGNER — is a user oriented APPLE SOFT program that does the HPLOTting for you. Sometimes referred to as the "poor man's graphics tablet", it places lines and complex circular functions on the APPLE HIRES screen with the use of game controls and single key strokes. 2 page animations, disk save and recall, and simple cursor-driven executions are among the features of this crash-proof program.

Both Require 48K Apple Soft, DOS 3.2.1. or 3.3
AVAILABLE FROM YOUR DEALER OR DIRECT FROM

cpu COMPUTER PACKAGES UNLIMITED
4 OAK POND AVE.
MILLBURY, MASSACHUBETTS 01527
(617) 799-0197 MasterCharge and VISA accepted

CIRCLE 106 ON READER SERVICE CARD



WORKING OVERTIME

APPLICATIONS WHICH SAVE TIME
Payroll, Word Processing, Accounting & Financial Management, Educational Administration, Legal, Medical & Dental Systems

Check your Local Dealer or Contact:

Charles Mann & Associates
7594 San Remo Trail
Yucca Valley, Ca. 92284
(714) 365-9718

Apple II **TRS-80** **TI 99/4**

CIRCLE 130 ON READER SERVICE CARD

Applesaurus, continued...

words — but a map of ideas (and data). A thesaurus is a structural bridge between someone who seeks information, and the source of the information itself. (Computing people use the words "thesaurus" and "dictionary" interchangeably, but mistakenly — for while dictionaries list words and their meanings, thesauri list meanings and some of the words that may be used to express them). Construction of a thesaurus requires thinking about organization; it requires the search for relations between ideas, correlations, analogies, shared classes, and so forth. Information (significant meanings) and organization go hand in hand.

Roget's Thesaurus is a major source of the organizational structure of the world brain.

Roget's *Thesaurus* — any real thesaurus — organizes ideas into semantic clusters. A thesaurus is a treasury, a storehouse, of well-organized, classified, and orderly arranged ideas. All in all, the following major clusters are found in Roget's *Thesaurus:*

The cluster of clusters: *The World*

Subdivided into:

The Natural World	*The Human World*
•	•
•	•
•	•

Basic Files:

1. Abstract Relations	1. Sensation
2. Space	2. Intellect
3. Physics	3. Volition
4. Matter	4. Affections

Basic records: 42 records of these eight classes

Fields: 1042 basic "fields" of the World.

This depicts graphically Roget's basic system of organization. He examined the many words of dictionaries and grouped them into 1000 basic classes (fields); these he further clustered into 42 larger classes; and these he reduced to the eight basic files. (Fields, records and files are each a higher level generalization than what precede them.)

H. G. Wells and W. C. Churchman are two people who have considered the problem of a world brain, i.e., of an organization appropriate to a universal storehouse of knowledge. Both of them recognized that organization is the DNA of a world brain. If knowledge is to be used effectively in dealing with real, practical, problems, then it must be organized properly. The problem, how are we to think of the world in general, and the World Brain in particular? is one that has as its most basic solution, Simplify! Simplify the myriad of terms in dictionaries and other data collections; seek out clusters of meaning; use those clusters to organize and classify that knowledge. A world Brain needs not just a dictionary, but a thesaurus; not just fields, but systematically arranged files and records.

The World Brain, a universal brain, needs a simple synopsis of meanings — files, records, fields — as the "field theoretical" framework in terms of which of the lists of words and data can be seen as significant. While Roget's *Thesaurus* is by no means the best one that can be constructed, it is, I think, a prime candidate for honors as the Thesaurus of the World Brain.

The Applesaurus Program

Having dealt with the theoretical aspects of Roget's *Thesaurus*, we can now consider the program for using its synopsis of categories, and the practical uses to which the program may be put.

The data base for the program consists in 1098 words stored serially in DATA statements. Given the limitations of my RAM base and cassette set-up, I had room in the program only for two sets of routines to perform two kinds of manipulation on this list of words.

There are two sorts of things that one may wish to know something about concerning that list of words: (1) What is their individual location, where are they found in a system of classification? and (2) Into what sorts of structural clusters do they fall? The two sets of routines are partial answers to these questions. The function of the two kinds of routine can best be explained by a step through the program.

I was showing my father how the program worked. He told me he had a course on "Public Speaking" to prepare, so that gave me a good opening for examining the program:

1. LOAD & RUN (Wait five seconds for DATA READ)

2. The Main Operating Menu Lists four options:

1. Data Structure & Sequence
2. Dyadic Relations
3. Triadic Relations
4. Tetradic Relations.

3. I chose #1. There are four options here also:

1. Graphic outline of the data base
2. Files & Records
3. Files - Records - Fields
4. Serial List of all words.

4. I chose #1.1 and showed my father how the data was organized. File #6 on Intellect seemed to be the place to look for information about public speaking.

5. So I chose Operation #1.2 and examined the records of the Intellect File. The Third record was on the "Communication of Ideas."

6. So the next step was Operation #1.3 to examine the fields of the Communication of Ideas record of the Intellect File. *Comment: This is one basic use of the list of words and the program. It is helpful in locating ideas, and in locating related & relevant ideas. For instance, by examining the list of fields in the Communication of Ideas record, a long list of possible themes and topics for the course was discovered. For any idea, or idea organization, locating ideas is a primary interest.*

Roget would have felt right at home in the present day. What he wanted was a machine that could help him study words and ideas.

7. The next step was operation #1.4. I had all the words under Intellect (File #6) listed, then all words under files #5 to 8 which are the files for the Human World. By this time, my father was bursting with ideas. He left to go do some thinking on his course. I told him he should plan on using my program again in a few days as he'd want to use the second set of routines to manipulate the data.

8. The second set of routines may be called by Menu operations 2, 3, & 4. How they are to be used, and why they are useful need to be explained at some length.

As noted earlier, Roget developed his system of organization by seeking for semantic clusters — combinations, correlations, etc. — between words. The terms *antonym* and *synonym* had not yet been invented and, anyway, Roget felt that there were no real synonyms. Each word had a different meaning, but all words share some affinity of meaning. One such affinity is the fact that many words cluster together in pairs: black and white, good and bad, rare and well-done, and so forth. Similarly, Roget found that some pairs cluster with a third term that seems to mediate them. Thus we have grey, indifferent, medium, for the examples above. Originally, Roget wanted to organize his *Thesaurus* so that pairs and triplets of terms would

NEW! FROM Brøderbund Software

STRATEGY GAMES!

FAST ACTION GAMES!

THE SAGA CONTINUES . . .

IV TAWALA'S LAST REDOUBT

The cruel Emperor Tawala has been forced from his throne on the world of Galactica and has fled for his life to the planet of Farside, where he and a small bank of adherents prepare to make their last stand. Extreme solar conditions have isolated Farside from the rest of the galaxy, and so it remains to Benthi, leader of the local insurrectionists, to press the final assault on Tawala and his minions.

TAWALA'S LAST REDOUBT puts you in the position of rebel leader. You must intercept and decipher Tawala's secret messages to his supporters, form alliances with local chiefs, detect Tawala's spies in your midst, separate hard intelligence from enemy disinformation, avoid Tawala's military forays against you and, finally, lead the assault against the Prince's stronghold.

Minimum Configuration:
TRS-80 Cassette, 16K, Level II, $19.95
TRS-80 Disk, 32K, $24.95
APPLE Disk, 48K with APPLESOFT, $29.95

APPLE GALAXIAN

Apple Galaxian — In brilliantly colored array, the Galaxians swoop down from all sides in dazzlingly swift attacks to do battle upon the lone defender. This faithful rendition of that most popular of all bar games may drive you around the bend, but think of all the quarters you'll be saving! Apple II Integer or Plus, 48K disk, $24.95.

How to order: Ask your dealer or send check or money order for the exact retail price to:

Brøderbund Software
Box 3266, Eugene, Oregon 97403
Call (503) 343-9024 to order. NO CHARGE FOR SHIPPING AND HANDLING!
Visa and Mastercard accepted.

We've got more! Send for our free catalog!

Apple and Applesoft are trademarks of Apple Computer Co.
TRS-80 is a trademark of Radio Shack.

CIRCLE 129 ON READER SERVICE CARD

GLOBAL™ DATABASE MANAGEMENT SYSTEM

Extremely comprehensive, versatile user-oriented management system for database creation and list maintenance. Runs under CP/M* and CBASIC2 on a microcomputer system in only 48K RAM.**

Supplied on standard 8" IBM disk (TRS-80 Model II), complete with BASIC subroutine library in source code, with comprehensive manual. $300

MANUAL ONLY...$30

* Trademark of Digital Research
** Trademark of Software Systems

DEALER INQUIRIES INVITED

GLOBAL PARAMETERS
1505 Ocean Ave., Brooklyn, N.Y. 11230
212/258-5003

CIRCLE 198 ON READER SERVICE CARD

INNOVATIVE

We figure the more innovative we are, the more you'll benefit. We work hard at providing you with more in-depth software and hardware analyses, interviews, industry news and trends.

It's all there, every other week, in InfoWorld. If you have a special interest in personal computing, you can't afford to miss another issue of the microcomputer newspaper: InfoWorld.

Mail this form or facsimile to:
InfoWorld, 375 Cochituate Road, Framingham, Mass. 01701
Or call (800) 343-6474

InfoWorld

Please start my subscription to InfoWorld, the microcomputer newspaper. C41
☐ $18 one year (26 issues) Over 44% savings off newsstand price.
For rates outside U.S. contact the Publisher.
☐ My check is enclosed ☐ Bill Me
Charge my: ☐ Mastercharge ☐ BankAmericard/Visa ☐ American Express
(MC only list 4 digits above your name _____)
Card No. _____ Exp. Date _____
Signature _____ Date _____
First Initial _____ Middle Initial _____ Surname _____
Company Name _____ Position _____
Address _____
City _____ State _____ Zip Code _____
InfoWorld, 375 Cochituate Road, Framingham, Mass. 01701 (800) 343-6474

CIRCLE 208 ON READER SERVICE CARD

MASTERTYPE

A Game That Teaches Typing

Now you can learn to type while playing a game on your APPLE II. In MASTERTYPE, enemy words are attacking your base. You must type the words in order to repel and destroy the attackers. You get to see what you type in the center box, but if you take the time to look at your fingers you will probably be destroyed. Learning to type used to be incredibly dull and boring. MASTERTYPE makes it fun.

The MASTERTYPE diskette comes complete with 17 lessons taking you from simple letters through punctuation marks, plus a program for making your own lessons. To order your copy, send check or money order for $34.95 to:
MASTERTYPE
P.O. Box 5223, Stanford, CA 94305
Specify 13 or 16 sector (16 is default). Requires Applesoft (not the cassette version) and at least 32K.

CIRCLE 178 ON READER SERVICE CARD

NEED DISKETTES?

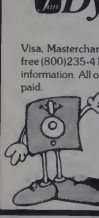
3M

BASF

MEMOREX

Dysan

Visa, Mastercharge accepted. Call free (800)235-4137 for prices and information. All orders sent postage paid.



PACIFIC EXCHANGES
100 Foothill Blvd
San Luis Obispo, CA
93401 (In Cal call
(805) 543-1037)

CIRCLE 204 ON READER SERVICE CARD

TRS-80 Computers

SAVE

Up To

$433.00

Buy Direct From

a Radio Shack®
AUTHORIZED SALES CENTER

Owned By

Pan American Electronics
Incorporated

Dept. CC, 1117 Conway
Mission, Texas 78572
Telex Number 767339
TOLL FREE NO. 800-531-7466
Texas & Principal No. 512-581-2765

CIRCLE 186 ON READER SERVICE CARD

Appiesaurus, continued...

be printed in columns. Since that was not feasible with the Gutenberg information retrieval system, we had to wait for the computer to make this a feasible possibility.

My second set of routines is designed to relate the words in any one file in pairs, triplets, or quadriplets. This form of manipulation is useful for several reasons.

If someone is going to organize anything — ideas, things, people — then the first task is to distinguish the aspects of those things from each other, i.e., to do an analysis. When analyzing, when dividing something up into its basic components, we all use certain mental tools, either implicitly or explicitly, in the process.

To examine words clustered into twos, threes and fours helps inspire organizing originality.

Some people seem to more easily divide things into twos, others into threes or fours or more. Anthropologists and psychologists, among others, have been very interested in this phenomenon. My point of view on the matter is simply that it is useful to be able to "think" and "analyze" in more than one way, in terms of more than one basic mind-number set. One procedure that can be used to facilitate this ability is to examine words clustered into twos, threes and fours. This procedure helps not only in giving one a feeling for a great many more pairs of terms than one might normally use, but it indicates interesting clusters of three and four terms. The latter clusters can inspire organizing originality. That is, something that one might normally organize in one habitual way, may take on new interest if organized (and analyzed) in a new way.

Buckminster Fuller has presented numerous arguments in support of his notion that "Nature" is organized in terms of a limited number of structural units of which the tetrahedron is the prime example. It may well turn out that "mind" has similar structural aspects. Searching for clusters of terms may be one way of "doing" structural semantics, and that is why I said at the start that someone can do research in the (arcane) discipline of Structural Semantics even on a very limited personal computing system. In the program, there is an INPUT for user choice of the frequency of words. This is simply a way of allowing variation in the way words are formed into clusters. Frequency one prints, for example, the first two words in a file, then the next immediate two. Frequency two prints the first two, then skips a word and prints the two after that. Frequency three prints the first two, then prints the second item in the first pair as the first item in the second pair, and so on. This routine allows for a large variety of clusters. About 5000 clusters (combinations) can be formed using the limited data base in the program.

The program itself is organized in modules as follows:

Lines 500+ DATA Statements
- 400 Main Program
  - 440 Data Structure & list manipulations
    - Subroutines: 180, 140, 470, 110
  - 200 Dyadic Relations Routine
    - Subroutines: 121, 220
  - 250 Triadic Relations Routine
    - Subroutines: 121, 270
  - 300 Tetradic Relations Routine
    - Subroutines: 121, 320

1 to 199 General function subroutines

The program was implemented on an Apple II with 32K RAM using cassette Applesoft Basic. The program and data is 14K. About 3K is needed to RUN. After a LOAD and RUN, 2400 bytes are still free, and only 120 additional bytes are used by the non-dimensioned variables in the program.

List of Variables:

1. AZ$(1098) is the only DIMensioned variable.

2. DF$,DY$,TR$,TE$, A$, Z$ — String$ variables A,M,FZ,WN,X1,X2, V1,V2,I,W,IN,CN,VZ — Input Variables □

Program Listing

```
 1  REM  THESAURUS ANALYSER
 2  REM  BY DEREK KELLY
 3  GOTO 400
 4 ;:
 5  FOR A = 1 TO 40: PRINT "-";: NEXT
      A: RETURN
 6  FOR A = 1 TO 40: PRINT "-";: NEXT
      A: RETURN
 7  PRINT "-->";: RETURN
 8  PRINT "?-";: GET Z$: RETURN
 9 M = M + 1: RETURN
10 M = M + 2: RETURN
12  PRINT  TAB( 40 -  LEN (A$)) /
     2;A$: RETURN
13  PRINT  TAB( 10)"(ENTER '0' TO
     RETURN)": RETURN
14 ;:
15  PRINT  TAB( 20)"!";  PRINT  TAB(
     20)"!";: RETURN
16  FOR A = 10 TO 30: PRINT  TAB(
     A)"=";: NEXT A: PRINT : RETURN
```

OVER 8 MBytes OF SOFTWARE AT $8* PER DISKETTE FULL

The exchange library of The CP/M® Users Group has nearly 50 volumes of software available. Everything from editors, assemblers, languages, games, tools and more–and almost everything in full source code.

Send $6** for full library catalog.

THE CP/M USERS GROUP

1651 Third Avenue, New York, N.Y. 10028.

*Domestic price. Inquire for overseas price.
**The complete catalog of CPMUG is available for $6 prepaid to the U.S., Canada and Mexico. $11 prepaid to all other countries.
® CP/M is a registered trademark of Digital Research. The CP/M Users Group is not affiliated with Digital Research

DISCOUNT PRICES

APPLE II COMPUTERS

16K APPLE II	$1089.00
32K APPLE II	1134.00
48K APPLE II	1179.00
DISK W/CONTROLLER	545.00
DISK ONLY	475.00
APPLESOFT CARD	159.00
INTEGER CARD	159.00
PASCAL	425.00
SILENTYPE PRINTER	525.00
RAM MEMORY FOR TRS-80, APPLE 16K SET 4116's	45.00

NORTH STAR COMPUTERS

HRZ-1D-32K-ASM	$2125.00
HRZ-2D-32K-ASM	2475.00
HRZ-1Q-32K-ASM	2375.00
HRZ-2Q-32K-ASM	2990.00

VERBATIM DISKETTES

BOX OF 10	5¼"	29.50
BOX OF 10	8"	39.50

FREDERICK COMPUTER PRODUCTS
MUNICIPAL AIRPORT
FREDERICK, MD. 21701
(301) 694-8884

CIRCLE 159 ON READER SERVICE CARD

DISK DRIVE WOES?
PRINTER INTERACTION?
MEMORY LOSS?
ERRATIC OPERATION?

Don't Blame The Software!

Power Line Spikes, Surges & Hash could be the culprit!! Floppies, printers, memory & processor often interact! Our unique ISOLATORS eliminate equipment interaction AND curb damaging Power Line Spikes, Surges and Hash.

- **ISOLATOR (ISO-1) 3 filter isolated 3-prong sockets; Integral Surge/Spike Suppression; 1675 W Maximum load, 1 KW load any socket $62.95**
- **ISOLATOR (ISO-2) 2 filter isolated 3-prong socket banks; (6 sockets total); Integral Spike/Surge Suppression; 1675 W Max load, 1 KW either bank $82.95**
- **SUPER ISOLATOR (ISO-3), similar to ISO-1 except double filtering & Suppression $94.95**
- **ISOLATOR (ISO-4), similar to ISO-1 except unit has 6 individually filtered sockets $106.95**
- **ISOLATOR (ISO-5), similar to ISO-2 except unit has 3 socket banks, 9 sockets total $87.95**
- **CIRCUIT BREAKER, any model (add-CB) ..... Add $ 8.00**
- **CKT BRKR/SWITCH/PILOT (-CBS) ..... Add $16.00**

Master-Charge, Visa, American Express
Order Toll Free 1-800-225-4876
(except AK, HI, MA, PR & Canada)

Electronic Specialists, Inc.
171 South Main Street, Natick, Mass. 01760
Telephone & Modem (617) 655-1532

CIRCLE 142 ON READER SERVICE CARD

STATISTICAL ANALYSIS OF TIME SERIES STOCK, BUSINESS, EXPERIMENTAL DATA

ANA1* (ANALYSIS 1) is a set of BASIC Programs which enables the user to perform analyses on any time series data. From 26 to 260 data points (5 years weekly, 1 year daily) can be plotted on the entire screen in one of 5 colors using Apples' High Resolution capabilities. The data can be transformed into different colored graphic representations called transforms. They are: user specified moving averages, a least squares linear fit (best straight line), filters for time, magnitude, or percentage changes, and user created relationships between the data, a transform, or a constant using +,-,x,/ operators. Colored lines can be drawn between graphic points. Graphic data values or their weekly dates of occurrence can be displayed in text on the screen. Any graph or text can be outputted to a users printer. The Grid Scale is automatically set to the range of the graphs or can be user changed. As many colored graphs as wanted can be plotted on the screen and cleared at any time. The user can code routines to operate on the data/transform data or create his own disk file data base. ANA1 commands can be used with his routines or data base. An Update program allows the user to easily update his file with current data. Data Base included. DJI weekly average, 1897 to date.

The ANA1 two letter user commands are: CA = Calculate, no graph. CG = Clear Graphs, leave Grids. CK = Checking out program, known data. CO = Color of next graph (red, green, violet, white, blue). CS = Clear Screen. DL = Draw Line between points. FI = Filter data for time, magnitude, or percent change. FU = Data, transform, or constant Function with +, -, x, / operator. GD = Graphic mode, display all Graph Data on screen. GR = Graph data to screen. GS = Set Grid Scale. HE = Help, summary of any commands usage. LD = Load Data from disk file from inputted date to memory. LG = Leave Graphs' automatic Grid rescaling. LD = Look select a range of the LD data and GR. All commands can now be used on this range. LS = Least squares linear fit of the data. MA = Moving Average of the data. NS = No Scale, next graph on screen does not use Grid Scale. NT = No Trace. PR = User implemented Printer routine. TD = Text mode: display Text Data on screen. TI = Weekly time number to date or vice versa. TR = Trace. TS = Text Stop for number of lines outputted to screen when in TD. U1/U2 = User 1/2 implimented routines. VD = Values of Data outputted in text. VG = Values of Grid; low/high/delta. VT = Values of Transform outputted in text.

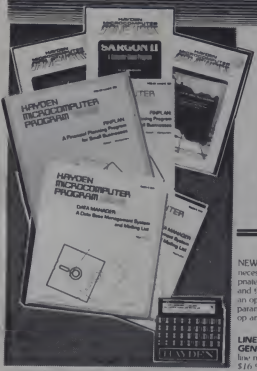
APPLE® II, 48 K, APPLESOFT ROM CARD, DISK II DOS 3.2 ANA1 DISK & MANUAL . . . $49.95 (CA residents add 6% sales tax)

GALAXY DEPT. CC3 P.O. BOX 22072 SAN DIEGO, CA 92122

* Software Reviews in: Call-A P P L E (2/80), Apple Orchard (3/80); Info World (6/80), Creative Computing

```
17  PRINT  TAB( 10)"!";: PRINT  TAB(
    30)"!": PRINT
18  PRINT  TAB( 5)AZ$(H),: GOSUB
    9: PRINT  TAB( 25)AZ$(H)
19  GOSUB 26: RETURN
20  FOR A = 10 TO 30 STEP 10: PRINT
    TAB( A)"!";: NEXT A: PRINT
    : RETURN
21  PRINT  TAB( 2)AZ$(H): GOSUB 9
    : PRINT  TAB( 15)AZ$(H): GOSUB
    9: PRINT  TAB( 27)AZ$(H)
22  GOSUB 26: RETURN
23  FOR A = 5 TO 35: PRINT  TAB(
    A)"-";: NEXT A: PRINT
24  FOR A = 5 TO 35 STEP 10: PRINT
    TAB( A)"!";: NEXT A: PRINT
    : RETURN
25  PRINT AZ$(M);: GOSUB 9: PRINT
    TAB( 9)AZ$(M);: GOSUB 9: PRINT
    TAB( 22)AZ$(M);: GOSUB 9: PRINT
    TAB( 30)AZ$(M)
26  IF FZ = 1 THEN M = M + 1
27  IF FZ = 2 THEN M = M + 2
28  IF FZ = 3 THEN M = M - 1
29  RETURN
30  ::
50  PRINT  TAB( 8)"FREQ:I=+!": PRINT
    TAB( 13)"2=+2": PRINT  TAB(
    13)"3=-1"
51  HTAB (15): INPUT "$:"$FZ: HTAB
    (15): INPUT "$:"$WN: RETURN
55  GOSUB 15: GOSUB 16: GOSUB 17:
    GOSUB 26: GOSUB 10: RETURN
65  GOSUB 15: GOSUB 16: GOSUB 20:
    GOSUB 21: RETURN
75  GOSUB 15: GOSUB 23: GOSUB 25:
    RETURN
76 DF$ = "1. DATA STRUCTURE & SEQ
    UENCE": RETURN
78 DV$ = "2. DYADIC RELATIONS": RETURN
80 TR$ = "3. TRIADIC RELATIONS": RETU 4
82 TE$ = "4. TETRADIC RELATIONS":
    RETURN
84  PRINT  TAB( 5)"!";: PRINT  TAB(
    35)"!": RETURN
86  PRINT "BASIC FILES/SPECIES=";
    PRINT AZ$(2);: PRINT AZ$(189
    ): PRINT AZ$(340)
87  PRINT AZ$(399);: PRINT AZ$(449
    ): PRINT AZ$(500);: PRINT AZ$
    (659): PRINT AZ$(986)
88  RETURN
90 X1 = 1:X2 = 447: RETURN
91 X1 = 448:X2 = 1098: RETURN
92 X1 = 1:X2 = 1098: RETURN
94  PRINT "FIELDS/INSTANCES=";: RETURN
95  PRINT "RECORDS/SUBSPECIES=";: RETU N
99 ::
100  REM READDATA
102  RESTORE : FOR I = 1 TO 1098:
    READ AZ$(I): NEXT I
104  RETURN
105 ::
110  HOME : GOSUB 5
111  PRINT "1.THE WIDER WORLD?": PRINT
    "2.THE HUMAN WORLD?": PRINT
    "3.THE WHOLE WORLD?"
112  INPUT "$"$H: IF H = 0 OR H =
    > 4 THEN 118
113  IF H = 1 THEN  GOSUB 90
114  IF H = 2 THEN  GOSUB 91
115  IF H = 3 THEN  GOSUB 92
116  FOR I = X1 TO X2: PRINT I;"
    AZ$(I): GOSUB 8: IF Z$ = "?"
    THEN 118
117  NEXT I
118  RETURN
119 ::
120  REM  GENERAL ASSIANMENTS
121 U1 = 2:U2 = 108: RETURN
122 U1 = 109:U2 = 339: RETURN
123 U1 = 340:U2 = 398: RETURN
124 U1 = 399:U2 = 448: RETURN
125 U1 = 449:U2 = 499: RETURN
126 U1 = 500:U2 = 650: RETURN
127 U1 = 659:U2 = 985: RETURN
128 U1 = 986:U2 = 1098: RETURN
134  REM
135  FOR I = U1 TO U2: PRINT I;"
    AZ$(I)
136  GOSUB 8: IF Z$ = "?" THEN 13
    8
137  NEXT I
138  RETURN
139 ::
140  REM DATA RECORDS/SUBSP
141  HOME : VTAB (4): GOSUB 5: GOSUB
    86
142  GOSUB 8: GOSUB 17: INPUT "$"
    ;IN: IF IN = 0 OR IN =  > 9 THEN
    178
144  GOSUB 95
145  ON IN GOSUB 150,154,156,160,
    162,164,166,170
146  GOTO 141
147 ::
150  GOSUB 7: PRINT "2."AZ$(2): GOSUB
    7: PRINT "3."AZ$(3): GOSUB 7
    : PRINT "12."AZ$(12): GOSUB
    7: PRINT "32."AZ$(32)
151  GOSUB 7: PRINT "58."AZ$(58):
    GOSUB 7: PRINT "86."AZ$(86)
    : GOSUB 7: PRINT "106."AZ$(1
    06): GOSUB 7: PRINT "141."AZ
    $(141)
152  GOSUB 7: PRINT "154."AZ$(154
    ): GOSUB 7: PRINT "157."AZ$(
    157): GOSUB 7: PRINT "162."A
    Z$(162)
153  GOSUB 8: RETURN
154  GOSUB 7: PRINT "189."AZ$(189
    ): GOSUB 7: PRINT "190."AZ$(
    190): GOSUB 7: PRINT "207."A
    Z$(207)
155  GOSUB 7: PRINT "258."AZ$(258
    ): GOSUB 7: PRINT "281."AZ$(
    281): GOSUB 8: RETURN
156  GOSUB 7: PRINT "340."AZ$(340
    ): GOSUB 7: PRINT "341."AZ$(
    341): GOSUB 7: PRINT "345."A
    Z$(345)
157  GOSUB 7: PRINT "353."AZ$(353
    ): GOSUB 7: PRINT "353."AZ$(
    353): GOSUB 7: PRINT "361."A
    Z$(361)
158  GOSUB 7: PRINT "367."AZ$(367
    ): GOSUB 7: PRINT "372."AZ$(
    372): GOSUB 7: PRINT "385."A
    Z$(385)
159  GOSUB 8: RETURN
160  GOSUB 7: PRINT "399."AZ$(399
    ): GOSUB 7: PRINT "400."AZ$(
    400): GOSUB 7: PRINT "408."A
    Z$(408)
161  GOSUB 7: PRINT "431."AZ$(431
    ): GOSUB 8: RETURN
162  GOSUB 7: PRINT "449."AZ$(449
    ): GOSUB 7: PRINT "450."AZ$(
    450): GOSUB 7: PRINT "454."A
    Z$(454): GOSUB 7: PRINT "457
    ."AZ$(457)
163  GOSUB 7: PRINT "466."AZ$(466
    ): GOSUB 7: PRINT "471."AZ$(
    471): GOSUB 7: PRINT "481."A
    Z$(481): GOSUB 8: RETURN
164  GOSUB 7: PRINT "500."AZ$(500
    ): GOSUB 7: PRINT "561."AZ$(
    561): GOSUB 7: PRINT "581."A
    Z$(581)
165  GOSUB 7: PRINT "582."AZ$("582
    "): GOSUB 8: RETURN
166  GOSUB 7: PRINT "659."AZ$(659
    ): GOSUB 7: PRINT "668."AZ$(
    668): GOSUB 7: PRINT "710."A
    Z$(710)
167  GOSUB 7: PRINT "746."AZ$(746
    ): GOSUB 7: PRINT "781."AZ$(
    781): GOSUB 7: PRINT "828."A
    Z$(828): 8: RETURN
168  GOSUB 7: PRINT "852."AZ$(852
    ): GOSUB 8: RETURN
170  GOSUB 7: PRINT "906."AZ$("906
    "): GOSUB 7: PRINT "975."AZ$("
    975"): GOSUB 7: PRINT "1011."
    AZ$("1011")
171  GOSUB 7: PRINT "1068."AZ$("10
    68"): GOSUB 8: RETURN
178  RETURN
179 ::
180  REM  DATA STRUCTURE
181  HOME : GOSUB 5: PRINT : PRINT
    TAB( 11)"*DATA STRUCTURE*":
    GOSUB 6
182  PRINT  TAB( 12)"GENERIC DIVI
    SIONS": GOSUB 15: GOSUB 23
183  GOSUB 84
184  PRINT AZ$(1);: PRINT  TAB( 2
    4)AZ$(448)
186  PRINT  TAB( 11)"(FILES/SPECI
    ES=)": PRINT
187  PRINT AZ$(2);: PRINT  TAB( 2
    4)AZ$(449)
188  PRINT AZ$(189);: PRINT  TAB(
    24)AZ$(598)
189  PRINT AZ$(340);: PRINT  TAB(
    24)AZ$(659)
190  PRINT AZ$(399);: PRINT  TAB(
    24)AZ$(986)
191  PRINT : PRINT  TAB( 5)"RECOR
    DS/SUBSPECIES=42 CLASSES"
192  PRINT : PRINT  TAB( 2)"FIELD
    S-INSTANCES=1042 SYNOPTIC MO
    RDS"
193  GOSUB 8
198  RETURN
199 ::
200  REM DYADIC RELATIONS
204  HOME : VTAB (4): GOSUB 5: PRINT

205  GOSUB 86: GOSUB 6: GOSUB 13
206  PRINT  TAB( 12)XX$
207  GOSUB 58
208  IF WN = 0 THEN 278
209  IF WN =  > 9 THEN 204
210  ON WN GOSUB 121,122,123,124,
    125,126,127,128
211  GOSUB 220
212  GOTO 200
213 ::
220 W = U1
221  GOSUB 55
222  GOSUB 8: IF Z$ = "?" THEN 23
    0
223  IF M <  = U2 THEN 221
230  RETURN
249 ::
250  REM TRIADIC
254  HOME : VTAB (4): GOSUB 86
255  GOSUB 6: GOSUB 13
256  PRINT  TAB( 12)TR$
257  GOSUB 58
258  IF WN = 0 THEN 280
259  IF WN =  > 9 THEN 254
260  ON WN GOSUB 121,122,123,124,
    125,126,127,128
262  GOSUB 276
263  GOTO 254
264 ::
270 W = U1
271  GOSUB 65
272  GOSUB 8: IF Z$ = "?" THEN 28
    0
273  IF M <  = U2 THEN 271
280  RETURN
299 ::
300  REM TETRADIC
304  HOME : VTAB (4): GOSUB 86
305  GOSUB 6: GOSUB 13
306  PRINT  TAB( 12)TE$
307  GOSUB 58
308  IF WN = 0 THEN 336
309  IF WN =  > 9 THEN 304
310  ON WN GOSUB 121,122,123,124,
    125,126,127,128
311  GOSUB 328
312  GOTO 304
313 ::
320 W = U1
```



Hayden Performance Software - from game room fun to boardroom business!

NEW! **HISTO-GRAPH** (Floyd) A calendar based histogram or bar graph production system. Allows the user to enter numeric data that relates to a date and reproduces that data as a high resolution histogram. *030909 Apple II Disk $29.95*

NEW! **DATA-GRAPH** (Floyd) Aids in the preparation of graphs and charts. Numeric data can be entered into Data Graph and used to create colorful one two- or four quadrant graphs. *030109 Apple II Disk $49.95*

NEW! **DOUBLE PRECISION FLOATING POINT FOR APPLESOFT/M** (A C Software) Extends the accuracy of the arithmetic available on the Apple from nine digits to a full 21 digit precision on all functions in Applesoft compatible format. *030809 Apple II Disk $49.95*

ORDER NOW!

Hayden Book Company, Inc
50 Essex Street, Rochelle Park, NJ 07662

Send me the software checked below. A check or money order is enclosed. I understand that Hayden pays shipping and handling costs and that I can return any disk or tape within 10 days if I am defective or I am dissatisfied with it for any reason. Residents of NJ add 5% state and sales tax. Offer good in USA only. Name of nearest dealer(s) must be filled in. (CC 1-80)

030103	030404	071004
030404	030404	071009
030408	030404	071011
030409	040404	072103
030410	040909	072303
030414	051003	080909
030460	051106	090809
030444	051303	091109
030484	051408	090909
030504	060103	097104

Name _____

Address _____

City/State/Zip _____

81-012

NEW! **OP-AMP DESIGN** (Gabrielson) Provides the necessary values for your design and will suggest appropriate op amp types. Includes a choice of six op amps and the program will then determine if your selection of an op amp will be acceptable within your chosen parameters. Can be updated to accommodate future op amps. *097104 Apple II tape $16.95*

LINE & VARIABLE CROSS REFERENCE GENERATOR (Johnson) Provides a cross reference of line numbers and variable names. *077401 PET tape $16.95*

APPLESOFT UTILITY PROGRAMS (Gilder) Increase your BASIC programming speed and flexibility. Contains 9 useful subroutines: 1 REM Writer 2 PRINT Writer 3 FORE Writer 4 Hexadecimal/Decimal Converter 5 Line Counter 6 Renumber 7 Append 8 Byte Counter 9 Slow List. Stop List *035041 Apple II tape $29.95*

RENUMBER & APPEND: Utility Programs for the Apple (Gilder) Renumber your Applesoft program and append a second program to the one in memory. *038041 Apple II tape $14.95*

REVIVE (Gilder) When a program is accidentally erased REVIVE searches through memory and finds the information that enables it to restore the pointers that have been changed. *038041 Apple II tape $19.95*

SLOW LIST/STOP LIST: Utility Programs for the Apple (Gilder) Start stop and control the speed of your program with Apple II's game paddles. *038041 Apple II tape $10.95*

PSEUDODISK (Neuschatz) This money saving program simulates a disk memory system for Integer BASIC programs. It allows multiple programs in memory at the same time which can be run from a catalog. *040404 APPLE II tape $24.95*

6502 DISASSEMBLER (Stamm) Produce assembly language source files with labeled subroutines and references from programs already in memory. It is compatible with Hayden's ASSEMBLY LANGUAGE DEVELOPMENT SYSTEM. *040609 APPLE II Disk $39.95*

DATA MANAGER: A Data Base Management System and Mailing List (Lutus) Store information on a floppy disk and retrieve it quickly and easily by specific names or by category. *045409 Apple II Disk Version $49.95*

Apple is a trademark of Apple Computer Company, Inc. and is not affiliated with Hayden Book Company, Inc.

FINPLAN: A Financial Planning Program for Small Businesses (Mansfield) Allows you to enter data from a balance sheet into the program to make assumptions about the future growth of business and to have the computer project results for up to a five year period based on those assumptions. And if you change any data the program revises all resulting data automatically. The disk version can be used only with TRSDOS Version 2.3. *051103 TRS 80 Level II tape $69.95, 051108 TRS 80 Level II Disk Version $74.95*

SARGON II (Spracklen) The Champ of champs an excellent program which will provide a true challenge for many players. Save your money and buy SARGON II. *80 Software Course: 038403 TRS 80 Level II 038404 Apple II 038410 OSI C1P 038460 OSI C4P each tape $29.95. 038406 TRS 80 Level II Disk 038409 Apple II Disk 038414 OSI C1P Disk 038444 OSI C4P Disk 038484 C4P Disk each $34.95*

BLACKJACK MASTER: A Simulator/Tutor/Game (Wasanex) A serious game that performs complex simulations and evaluations of playing and betting strategies. *053013 TRS 80 Level II tape, $24.95, 053108 TRS 80 Disk Version $29.95*

REVERSAL (Spracklen) Winner of the software division of the *First International Man Machine GITH LI OTH Tournament* this version of the 2000 year old game Reversi features 27 levels of play and high resolution color graphics. *070304 APPLE II tape $29.95, 070909 APPLE II Disk $34.95*

ROYAL FLUSH: Competitive Poker Solitaire (Wasanex) A game you can play alone or with any number of players. High score wins in this poker based fun filled card game. Choose from possible game variations. *071011 PET, 071013 TRS 80 Level II each tape $14.95*

STARCLASH (Walton) An exciting game of galactic strategy for one or two players. *059013 TRS 80 Level II tape $16.95*

PERFORMANCE! SOFTWARE

Available at your local computer store!

Hayden Book Company, Inc.

50 Essex Street, Rochelle Park, NJ 07662

CIRCLE 205 ON READER SERVICE CARD

```
321  GOSUB 75
322  GOSUB 8: IF Z$ = "?" THEN 33
     0
323  IF M < = V2 THEN 321
330  RETURN
349 ::
400  REM  MAIN PROGRAM
402  HOME : VTAB (3): GOSUB 5: PRINT

405 A$ = "CATEGORIES OF THESAURUS
     "
406  GOSUB 12
407  GOSUB 5: PRINT
408  PRINT "GIVE ME FIVE SECONDS,
     PLEASE!"
410  DIM AZ$(1898)
420  GOSUB 100
421  HOME : VTAB (4): GOSUB 5: GOSUB
     12: GOSUB 6
422  PRINT  TAB( 10)"MENU OF OPE
     "  RATIONS:": PRINT
423  PRINT "FREE=" FRE (0): PRINT

424  GOSUB 76: PRINT  TAB( 8)OF$
425  GOSUB 78: PRINT  TAB( 8)OV$
426  GOSUB 80: PRINT  TAB( 8)TR$
427  GOSUB 82: PRINT  TAB( 8)TE$
428  PRINT : GOSUB 6
429  GOSUB 13
430  PRINT  TAB( 13)"INPUT MENU #
     :";
431  INPUT MN
432  IF MN = 0  THEN  END
433  IF MN =  > 5 THEN 421
435  ON MN GOSUB 440,200,250,300
437  GOTO 421
438 ::
440  REM  DATA FORM-SEQ
442  HOME : VTAB (5): GOSUB 5: PRINT

444  PRINT  TAB( (40 -  LEN (DF$)
     ) / 2)DF$
446  PRINT  TAB( 8)"1. DATA FILES
     & STRUCTURE"
447  PRINT TAB( 8)"2. FILES & RE
     CORDS"
448  PRINT  TAB( 8)"3. FILES-RECO
     RDS-FIELDS"
449  PRINT  TAB( 8)"4. DATA SYSTE
     M & FIELDS"
450  GOSUB 6
451  GOSUB 13
452  INPUT "INPUT CHOICE #:";CN
454  IF CN = 0 THEN 465
456  IF CN =  > 5 THEN 440
458  ON CN GOSUB 180,140,470,110
462  GOTO 440
465  RETURN
469 ::
470  REM
471  HOME : VTAB (4): GOSUB 5
473  GOSUB 86
474  GOSUB 6: GOSUB 13: PRINT : INPUT
     "B";U2: IF V2 = 0 THEN 480
475  IF U2 =  > 9 THEN 470
476  GOSUB 94
477  ON U2 GOSUB 121,122,123,124,
     125,126,127,128
478  GOSUB 175
479  GOTO 470
480  RETURN
499 ::
500  REM
501  DATA THE WIDER WORLD,    I-A
     BSTRACT RELATIONS,EXISTENCE
502 ::
503  DATA EXIST,NONEXIST,SUBSTANT
     IAL,UNSUBSTANTIAL,INTRINSIC,
     EXTRINSIC,STATE,CIRCUMSTANCE

506  DATA RELATIONS,RELATION,UNRE
     LATED,BLOOD RELATION,IN LAW
     RELATION,CORRELATION,IDENTIT
     Y
510  DATA CONTRARY,DIFFERENT,UNIF
     ORM,NONUNIFORM,MULTIFORM,SIM
     ILAR,DISSIMULAR

512  DATA IMITATION,MONIMITATION,
     COPY,MODEL,ADREE,DISAGREE
516  DATA QUANTITATIVE,QUANTITY,D
     EGREE,EQUAL,UNEQUAL,MEAN,COM
     PENSATION,GREAT,SMALL
520  DATA SUPERIOR,INFERIOR,INCRE
     ASE,DECREASE,ADD,ADJUNCT,SUB
     TRACT,REMAIN,MIX
526  DATA SIMPLE,COMPLEX,JOIN,ANA
     LYSIS,SEPARATE,COHERE,NONCOH
     ERE,COMBINE
532  DATA ORDERING,ORDER,ARRANGE,
     CLASSIFY,DISORDER,DISARRANGE
     ,PRECEDE,SEQUENCE
536  DATA PRECURSOR,SEQUEL,BEGIN,
     MIDDLE,END,CONTINUE,DISCONTI
     NUE,ACCOMPANY,ASSEMBLE
540  DATA DISPERSE,INCLUSION,EXCL
     USION,EXTRANEOUS,GENERAL,PAR
     TICULAR
544  DATA SPECIAL,CONFORM,NONCONF
     ORM,ANOMALY,ABNORMAL
546  DATA NUMBERING,NUMBER,NUMERA
     TE,UNITY,UNITY,DUALITY,DUPLIC
     ATE,BISECT,THREE
550  DATA TRIPLE,TRISECT,FOUR,QUA
     DRUPLE,QUADRISECT,FIVE +
554  DATA PLURAL,NUMEROUS,FEW,REP
     EAT,INFINITE
556  DATA TEMPORALITY,TIME,TIMELE
     SS,PERIOD,SPELL,INTERIM,DURA
     BLE,TRANSIENT,PERPETUAL
560  DATA INSTANTANEOUS,TIME MEAS
     URE,ANACHRONISM,PRIOR,POSTER
     IOR,SIMULTANEOUS
562  DATA PAST,PRESENT,FUTURE,NEW
     ,OLD,YOUTH,YOUNGSTER,AGE,ADU
     LT,SENIOR
568  DATA TIMELY,UNTIMELY,EARLY,L
     ATE,MORNING,NIGHT
570  DATA FREQUENCY,INFREQUENCY,R
     EGULAR,IRREGULAR
572  DATA CHANGE,CHANGE,PERMANENC
     E,CHANGEABLE,STABLE,CONTINUE
     S,CESSATION
576  DATA CONVERT,REVERT,REVOLUTI
     ON,EVOLUTION,SUBSTITUTE,INTE
     RCHANGE
578  DATA EVENTS,EVENT,IMMANENCE
580  DATA CAUSATION,CAUSE,EFFECT,
     ATTRIBUTE,CHANCE
582  DATA POWERS,POWER,IMPOTENCE,
     STRONG,WEAK,ENERGY,VIOLENCE,
     MODERATE,OPERATE
584  DATA ENERGY,VIOLENCE,MODERAT
     E,OPERATE
586  DATA PRODUCE,NONPRODUCE,BIRT
     H,PRODUCT,PROCREATE,ANCESTRY
     ,POSTERIOR,INFLUENCE
590  DATA NO-INFLUENCE,TENDENCY,L
     IABLE,INVOLVE,CONCURR,COUNTE
     RACT
592 ::
593  DATA    II-SPACE,SPACE IN GE
     NERAL
594  DATA SPACE,REGION,COUNTRY,CO
     UNTRYSIDE,TOWN,LOCATION,DISL
     OCATION,PRESENCE
596  DATA ABSENCE,HABITAT,NATIVE,
     INHABITANT,ABODE,ROOM,CONTAI
     NER,CONTENTS
600  DATA DIMENSIONS,SIZE,LITTLE,
     GROWTH,CONTRACT,DISTANCE,NEA
     R,INTERVAL,LENGTH
604  DATA SHORT,THICK,NARROW,FILL
     MENT,HIGH,LOW,DEEP,SHALLOW,T
     OP,BOTTOM
610  DATA VERTICAL,HORIZONTAL,PEN
     DANCY,SUPPORT,SHAFT,PARALLEL
     ,OBLIQUE,INTERSECT
614  DATA CROSS,WEAVE,SEW,EXTERIO
     R,INTERIOR,CENTRAL,LAYER,COV
     ER,SKIN,MATR
618  DATA CLOTHING,DIVESTMENT,ENV
     IRONS,CIRCUMSCRIPT,BOUNDS,EN
     CLOSURE,INTERPOSE

622  DATA INTRUDE,CONTRAPOSE,FRON
     T,REAR,SIDE,RIGHTSIDE,LEFTSI
     DE
626  DATA STRUCTURE & FORM,STRUCT
     URE,FORM,FORMLESS,SYMMETRY,D
     ISTORT,STRAIGHT
628  DATA ANGULAR,CURVE,CIRCLE,CO
     NVOLUTE,ROTUND,CONVEX,CONCAV
     E,SHARP,BLUNT
632  DATA SMOOTH,ROUGH,NOTCH,FURN
     OH,FOLD,OPEN,CLOSE
636  DATA MOTION,MOVE,QUIET,SWIFT
     ,SLOW,TRANSFER,VEHICLE,TRAVE
     L,TRAVELER,WATERTRAVEL
640  DATA MARINE,BOAT,AVIATION,AV
     IATOR,PLANE,ROCKET,SPACETRAV
     EL,IMPULSE,REACT
646  DATA THROW,PULL,SUV,ATTRACT,
     REPEL,DIVERSE,DEVIATE,LEAD,F
     OLLOW,PROGRESS,REGRESS
650  DATA APPROACH,RECESSION,CONV
     ERGE,DIVERGE,ARRIVE,DEPART,E
     NTER,EMERGE,INSERT
656  DATA EXTRACT,RECEPTION,EAT,F
     OOD,NUTRITION,EJECT,EXCRETE,
     SECRETE,OVERRUN
660  DATA SHORTCOMING,ASCENT,DESC
     ENT,ELEVATION,DEPRESS,LEAP,P
     LUNGE
664  DATA CIRCUITOUS,ROTATION,OSC
     ILLATE,AGITATE
665 ::
666  DATA    III-PHYSICAL SCIENCE
     S,PHYSICS,PHYSICS,ATOMICS,RA
     DIATION
668  DATA HEATING,HEAT,HEATING,CO
     OK,FUEL,INCOMBUSTIBLE,COLD,R
     EFRIGERATE
670  DATA LIGHT,LIGHT, LIGHTSOURC
     E,DARK,SHADE,TRANSPARENT,SEM
     ITRANSPARENT,OPAQUE
674  DATA ELECTRICITY-ELECTRONICS
     ,ELECTRIC,ELECTRONIC,RADIO,T
     V,RADAR
676  DATA MECHANICS,MECHANICS,TOO
     LS,AUTOMATION,FRICTION
678  DATA PHYSICAL PROPERTIES,TEX
     TURE,WEIGHT,LIGHT,DENSE,RARE
     ,RIGID,HARD,SOFT
682  DATA ELASTIC,TOUGH,FRAGILE,P
     OWDERY
684  DATA COLORFULNESS,COLOR,COLO
     RLESS,WHITE,BLACK,GRAY,BROWN
     ,RED,ORANGE,YELLOW
688  DATA GREEN,BLUE,PURPLE,VARIE
     GATION
689 ::
690  DATA    IV-MATTER,MATTER IN
     GENERAL
692  DATA UNIVERSE,MATERIAL,IMMAT
     ERIAL,MATERIALS,CHEMICAL,OIL
     ,RESINS
694  DATA INORGANIC MATTER,INORGA
     NIC,METALS,ROCK,LAND,BODY-OF
     -LAND-PLAIN,LIQUID,PULP,LIQU
     EFY
700  DATA MOISTURE,DRY,RAIN,STREA
     M,CHANNEL,OCEON,LAKE,GULF,MA
     RSH,GAS,AIR,WIND,CLOUD,BUBBL
     E
706  DATA ORGANIC MATTER,ORGANIC,
     LIFE,DEATH,KILL,INTERMENT,PL
     ANTS,BOTONY
710  DATA AGRICULTURE,ANIMAL,ZOOL
     OGY,HUSBANDRY,HUMANS,PEOPLES
     ,SEX,MALE,FEMALE
712 ::
714  DATA  THE HUMAN WORLD,    V-
     SENSATION,SENSATIONS IN GENE
     RAL
716  DATA SENSATION,INSENSIBILITY
     ,PAIN
717  DATA SENSE OF TOUCH,TOUCH,SE
     NSATIONS OF TOUCH
718  DATA SENSE OF TASTE,TASTE,SA
     VORY,UNSAVORY,INSIPID,SWEET,
     SOUR
```

INTERACTIVE FICTION™

BECOME A FICTIONAL CHARACTER AND *REALLY* GET INTO THE STORY!

"It's Great!"
Ted Nelson's review in
Feb. Creative Computing

Interactive Fiction is story-telling using a computer, so that you can *take part* in the story instead of merely reading it. Just type in your responses to the other characters, and see what they say!

Six Micro-Stories $14.95
A good introduction to Interactive Fiction. You are a spy in Hitler's Third Reich, the pilot of a doomed "4", and more. TRS-80 mod I, Apple II.

Two Heads of the Coin $19.95
A psychological mystery set in the London of Sherlock Holmes. Will put your analytic skills (and your social graces!) to the test. TRS-80 mod I.

His Majesty's Ship "Impetuous" $19.95
The decisions you make as captain of a King's ship will determind your fate in this swashbuckling story of the days of fighting sail. TRS-80 mod I, Apple II.

The Dragons of Hong Kong $19.95
On a secret mission to the Far East you encounter danger, death (perhaps your own!) and—if you are lucky—the woman of your dreams. TRS-80 mod I.

For TRS-80 disk and Apple disk

Interactive Fiction, Box 603, Inverness, CA, 94937
Calif. residents add 6% sales tax. *TRS-80 is a trademark of the Tandy Corp.*

CIRCLE 160 ON READER SERVICE CARD

Tired of hearing about PASCAL?

We think you've waited long enough

At last, there is an easy to understand Pascal sampler to help you learn Pascal programming. **LinkSampler**. And the Pascal programmer, two Pascal utility programs to increase your programming productivity. **LinkVideo** and **LinkDisk**.

Link Systems backs its commitment to quality Pascal software with fifteen years of mainframe and micro computer programming experience.

LinkSampler™ is an entertaining Pascal learning tool, supplied with easy-to-understand documentation. **LinkSampler** includes a full diskette of games, math procedures and financial programs.

LinkSampler I will help you put into practice what you've only read.

LinkDisk™ compares, examines and changes any byte on an Apple Pascal disk and translates DOS Basic into Pascal.

(C)ompare.
Insures that a disk copy was performed without error, and the copy is readable. Good for Pascal and Basic.

(E)xamine.
Enables you to examine and change data on mass storage, change data byte by byte and alter any nibble of data.

(T)ranslate.
Translates DOS 3.3 text and Binary files into Pascal.

LinkVideo™ saves valuable **input**, output programming time, and provides terminal independence for essential screen functions.

- Erase to End of Line
- Erase to End of Screen
- Clear Screen
- Cursor moves (both input and output)
- Line and Search Erasure
- Filters. Validates and prompts input for Strings, Fields, Boolean, Social Security Numbers, Telephone Numbers, Dates, Integers, Pseudo-Reals.

LINK SYSTEMS™

☐ Please send me more information.
☐ Please send me more information. I am a Dealer. **Dealer Sales (213) 871-1511**

Name _____

Address _____

City _____ Zip _____

Telephone _____

Link Systems, 1655 26th Street, Santa Monica, CA 90404 CC/TP/1

CIRCLE 270 ON READER SERVICE CARD

EPSON PRINTERS
OKIDATA PRINTERS

OKIDATA

Microline 80	$559.00
Microline 80 Tractor Feed	114.00
Microline 80 Serial Interface	120.00
Microline 80 TRS-80® Expansion Interface Cable	29.95

EPSON

MX-80	Call
MX-80 Apple® Interface	or
MX-80 Apple® Interface Cable	Circle
MX-80 TRS-80® Expansion Interface Cable	Number
MX-80 Serial Interface	for
MX-80 IEE-488 Interface	Prices
MX-80 IEE-488 (Pet®) Cable	

VISTA TRS-80® DISK DRIVES

V-80 40 Track Model 1 Drives	$399.00
Model 1 two Drive Cable	27.95
Model 1 four Drive Cable	27.95
Model 2 Disk Drives	CALL

CASSETTE TAPES
(Quality screw type with lables on sheets for typewriter)

C-10	1-49	$ .75 Plastic
C-10	50-up	$ .65 Boxes
C-20	1-49	$ .90 Included
C-20	50-up	$ .78

Circle number for complete price list.

TRS-80, Apple, and Pet are trademarks of Radio Shack, Apple Computer, and Commodore.

TERMS: Money order, personal check (5 working days to clear), certified check, C.O.D. (Money order or certified check on delivery) California residents add sales tax.

PROCESS CONTROL TECHNOLOGY
P. O. BOX 8625
STOCKTON, CA 95208
(209) 952-8678

CIRCLE 223 ON READER SERVICE CARD

APPLE TRS-80 PET

PERSONAL COMPUTING

APPLE II "VISICALC"	$170.00
PET OR ATARI "VISICALC"	$179.95
APPLE II "DESKTOP PLAN"	$ 89.95
APPLE II "DESKTOP PLAN II"	$179.95
APPLE II "ECA DATA MANAGEMENT"	$ 89.95
TRS-80 "ECA DATA MANAGEMENT"	$ 61.95

THE MUSE COMPANY - FOR THE APPLE II

SUPER TEXT II WORD PROCESSOR	$131.25
FORM LETTER MODULE	$ 90.00
ADDRESS BOOK MAILING LIST	$ 44.95

PROGRAMMA INT'L - FOR APPLE II

WORD PROCESSING SYSTEM-APPEL PIL & FORMAT	$174.95
(SPECIFY STANDARD, DOUBLEVISION, SUPERTERM, VIDEOTERM)	
(ADD PROGRAMMA PRELOAD WORD PROCESSING AND ADDED $20.00)	

DAKINS SOFTWARE - FOR APPLE II

PROGRAMMING AIDS 3.3 UTILITY FOR APPLE	$ 91.00
(THE ANALYZER FOR THE APPLE INTERFACE)	$69.00

STONEWARE PRODUCTS

DB MASTER 2.A	$175.00
(ADD DB MASTER UTILITY PAK)	$ 80.00

SOUTHWESTERN SYSTEMS

ONLINE - A PRIVATE ACCESS DIAL UP SYSTEM	$ 84.95
Z-TERM Z80-CP/M COMMUNICATIONS PACKAGE	$ 79.95

"SCOTCH" HEAD CLEANING KIT $27.00

CALIFORNIA RESIDENTS ADD 6% SALES TAX
SEND FOR FREE DISCOUNT CATALOG

VISA **J. STUART AUBER**
P.O.BOX 182 ENCINO,CA.91316
(213) 705-7421
SAVEMORESAVEMORESAVEMORE

CIRCLE 212 ON READER SERVICE CARD

```
720  DATA PUNSENT,TOBACCO,SENSE O
     F SMELL,ODOR,FRAGRANCE,STENC
     H,ODORLESS
722  DATA SENSE OF SIGHT,VISION,O
     FFECTIVE VISION,BLIND,SPECTA
     TOR
724  DATA OPTICAL,VISIBLE,INVISIB
     LE,APPEARANCE,DISAPPEAR
726  DATA SENSE OF HEARING,HEAR,D
     EAF,SOUND,SILENCE,FAINTSOUND
     ,LOUD,RESONANCE
730  DATA REPEATED-SOUND,EXPLOSIO
     N,SIBILATION,STRIDOR,CRY,ANI
     MAL SOUNDS
734  DATA DISCORD,MUSIC,HARMONIC,
     MUSICIAN,MUSIC-INSTRUMENTS
735 :::
736  DATA    VI-INTELLECT,INTELLE
     CTUAL FACULTIES
738  DATA INTELLECT,WISDOM,WISEPE
     RSON,UNINTELLIGENT,FOOLISH,F
     OOL,SANITY
740  DATA INSANE,ECCENTRIC,KNOWLE
     DGE,INTELLECTION,IGNORANCE,T
     HOUGHT,IDEA,THOUGHTLESS
744  DATA INTUITION,REASON,SOPHIS
     TRY,TOPIC,INQUIRY,ANSWER,SOL
     UTION,DISCOVERY
748  DATA EXPERIMENT,MEASURE,COMP
     ARE,DISCRIMINATE,INDISCRIMIN
     ATE,JUDGE,PREJUDGE
750  DATA MISJUDGE,OVERESTIMATE,U
     NDERESTIMATE,THEORY,PHILOSOP
     HY,BELIEF,CREDULITY
754  DATA UNBELIEF,INCREDULITY,EV
     IDENCE,DISPROOF,QUALIFY,KNOW
     UALIFY,POSSIBLE
758  DATA IMPOSSIBLE,PROBABLE,IMP
     ROBABLE,CERTAIN,UNCERTAIN,GR
     OBLE,TRUTH
762  DATA MAXIM,ERROR,ILLUSION,DI
     SILLUSION,ASSENT,DISSENT,AFF
     IRM,NEGATE
766  DATA STATES OF MIND,MENTAL A
     TTITUDE,BROADMINDED,NARROWMI
     NDED,CURIOUS
768  DATA INCURIOUS,ATTENTION,INA
     TTENTION,CONFUSION,CAREFUL,N
     EGLECT,IMAGINATION
770  DATA UNIMAGINATIVE,MEMORY,FO
     RGETFUL,EXPECT,UNEXPECT
774  DATA DISAPPOINT,FORESIGHT,PR
     EDICT,PRESENTIMENT
776  DATA COMMUNICATION OF IDEAS,
     MEANING,LATENCY,MEANINGLESS,
     INTELLIGIBLE
778  DATA UNINTELLIGIBLE,AMBIGUIT
     Y,FIGURE OF SPEECH,INTERPRET
     ATION
780  DATA MISINTERPRETATION,COMMU
     NICATION,MANIFESTATION,DISCL
     OSURE
782  DATA INFORMATION,NEWS,PUBLIC
     ATION,COMMUNICATIONS,MESSENG
     ER,TEACH,MISTEACH,LEARN
786  DATA TEACHER,STUDENT,SCHOOL,
     INDICATION,INSIGNIA,RECORD,R
     ECORDER,REPRESENT
790  DATA MISREPRESENT,ART,SCULPT
     URE,CERAMICS,PHOTOGRAPHY,GRA
     PHICS,ARTIST,LANGUAGE
794  DATA LETTER,WORD,NAME,ANONYM
     ITY,PHRASE,GRAMMAR,UNGRAMMAT
     ICAL,DICTION
798  DATA ELEGANCE,INELEGANT,PLAI
     NTALK,CONCISE,DIFFUSE,SPEECH
     ,BADSPEECH,TALKATIVE
802  DATA CONVERSE,SOLILOQUY,PUBL
     ICTALK,ELOQUENCE,GRANDILOQUE
     NCE,WRITE,PRINT,CORRESPOND
806  DATA BOOK,TREATISE,ABRIDGE,D
     SCRIBE,POETRY,PROSE,ENTERTA
     INMENT,ENTERTAINER
810  DATA UNCOMMUNICATIVE,SECRET,
     CONCEAL,FALSE,EXAGGERATE,DEC
     EIVE,DECEIVER,DUPE
812 :::
```

```
814  DATA VII-VOLITION,VOLITION I
     N GENERAL,WILL,WILLING,UNWIL
     LING,RESOLUTION
816  DATA PERSEVERE,OBSTINATE,IRR
     ESOLUTE,CHANGEABLE,CAPRISE,I
     MPULSE,AVOIDANCE,ESCAPE
820  DATA ABANDON,DESIRE,EAGER,IN
     DIFFERENT,CHOICE,REJECT,NECE
     SSITY,PREDETERMINE
824  DATA PREDERANGE,CUSTON,UNACC
     USTOMED,FASHION,CONVENTION,F
     ORMAL,INFORMAL,MOTIVATE
828  DATA PRETEXT,ALLUREMENT,BRIB
     E,DISSUADE,INTEND,PLAN,PURSU
     E,OCCUPATION
832  DATA WAY,MEANS,EQUIPMENT,SUP
     PLY,SUFFICIENT,INSUFFICIENT,
     EXCESS,SATIETY
836  DATA USE,CONSUME,MISUSE,DISU
     SE,USELESS
838  DATA CONDITIONS OF VOLITION,
     EXPEDIENCE,INEXPEDIENT,IMPRO
     PRIETY,UNIMPORTANT
840  DATA GOOD,BAD,BANE,PERFECT,I
     MPERFECT,BLEMISH,MEDIOCRITY,
     CLEAN,UNCLEAN
844  DATA HEALTHFUL,UNHEALTHFUL,H
     EALTH,DISEASE,REMEDY,HEAL,TH
     ERAPY,PSYCHOLOGY
848  DATA IMPROVE,IMPAIR,DESTROY,
     RESTORE,REFRESH,RELAPSE
852  DATA DANGER,SAFE,PROTECT,REF
     UGE,PRESERVE,RESCUE,HARM,ALA
     RM
856  DATA VOLUNTARY ACTION,ACTION
     ,INACTION,ACTIVE,INACTIVE,HA
     STE,LEISURE,REST,SLEEP
860  DATA AWAKE,ENDEAVOUR,UNDERTA
     KE,EXERT,FATIGUE,DOER,WORKPL
     ACE,PREMISES
864  DATA UNPREPARED,ACCOMPLISH,H
     ONAccOMPLISHMENT,SUCCESS
866  DATA FAILURE,VICTORY,DEFEAT,
     PROSPER,ADVERSITY,HINDRANCE,
     DIFFICULT,FACILITY
870  DATA SKILL,UNSKILLFUL,CUNNIN
     G,ARTLESS,BEWARE,HISBEWARE
872  DATA AUTHORAITY & CONTROL,AUT
     HORITY,LAWLESS,GOVERN,LEGISL
     ATE,UN,POLITICS
876  DATA POL-ECON PRINCIPLES,POL
     ITICIAN,MANAGEMENT,DIRECTOR,
     MASTER,EMPLOYEE
878  DATA PRECEPT,COMMAND,DEMAND,
     ADVICE,COUNCIL,COMPEL
882  DATA STRICT,LAX,LENIENT,REST
     RAINT,CONFINE,FREEDOM,LIBERA
     TION,SUBJECTION
886  DATA SUBMIT,OBEY,DISOBEY,OBS
     ERVE,PRESERVE,PROMISE,COMP
     ACT,SECURITY
890  DATA OFFER,REQUEST,CONSENT,R
     EFUSAL,PERMIT,PROHIBIT,REPER
     L,COMMISSION
894  DATA AGENT,PROMOTE,DEMOTE,RE
     SIGN
896  DATA SUPPORT & OPPOSITION,AI
     D,COOPERATE,ASSOCIATE,ASSOCI
     ATION,LABOR-UNION
898  DATA OPPOSITION,OPPONENT,RES
     ISTANCE,DEFY,ACCORD,DISACCOR
     D,CONTEND
902  DATA WAR,ATTACK,DEFENSE,COMB
     ATANT,ARMS,ARENA,PEACE,PACIF
     Y,MEDIATE,NEUTRAL,COMPROMISE

906  DATA POSSESSIVE RELATIONS,PO
     SSESS,POSSESSOR,PROPERTY,ACQ
     UIRE,LOSS,RETAIN
910  DATA RELINQUISH,PARTICIPATIO
     N,APPORTION,TRANSFER,GIVE,RE
     CEIVE,LEND
914  DATA BORROW,TAKE,RESTORE,THE
     FT,THEIF,ILLICIT,COMMERCE,PU
     RCHASE
918  DATA SALE,MERCHANT,MERCHANDI
     SE,MARKET,STOCKS,SECURITY,MO
     NEY,INVEST
```

```
922  DATA WEALTH,POVERTY,CREDIT,D
     EBT,PAY,MONEY,SPEND,RECEIPT
     ,ACCOUNTS,FEE,DISCOUNT
926  DATA EXPENSIVE,CHEAP,COSTLES
     S,ECONOMY,PARSIMONY,LIBERAL,
     PRODIGAL
928  DATA CHEAP,COSTLESS,ECONOMY,
     PARSIMONY,LIBERAL,PRODIGAL
929 :::
930  DATA  VIII-AFFECTIONS,PERSON
     AL AFFECTIONS
932  DATA FEEL,UNFEEL,EXCITE,UNEX
     CITE,NERVOUS,UNNERVOUS,PATIE
     NCE,IMPATIENCE
934  DATA PLEASANT,UNPLEASANT,PLE
     ASURE,UNPLESURE,DISLIKE,CON
     TENT,DISCONTENT
938  DATA CHEERFUL,SOLEMN,SAD,REG
     RET,UNREGRET,LAMENT,REJOICE
942  DATA CELEBRATE,ANNUSE,DANCE,H
     UMOR,WIT,BANTER,DULL,TEDIUM,
     AGGRAVATION,RELIEF
946  DATA COMFORT,HOPE,HOPELESS,A
     NXIETY,FEAR,COWARDICE,COURAGE,R
     ASH,CAUTION,FASTIDIOUS
950  DATA TASTE,VULGAR,UGLY,BEAUT
     Y,ORNAMENT,PLAIN,AFFECTATION
     ,DETENTATION
956  DATA PRIDE,HUMBLE,SERVILE,MO
     DEST,VAIN,BOAST,BLUSTER,ARRO
     GANCE,INSOLENCE
960  DATA REMORSE,DISREPUTE,HONOR,
     TITLE,NOBLE,COMMON,WONDER,WO
     NDERLESS
964  DATA SYMPATHETIC AFFECTIONS,
     SOCIABLE,UNSOCIABLE,SECLUSIO
     N,HELCOME,INHOSPITABLE,FRIEN
     DSHIP,FRIEND,ENEMY,HATE,LOVE

968  DATA LOVEMAKING,MARRIAGE,CEL
     IBACY,DIVORCE,COURTESY,DISCO
     URTESY,KIND,UNKIND
972  DATA MISANTHROPY,PUBLIC-SP,R
     IT,BENEFACTOR,EVILDOER,PITY
976  DATA KETILESS,CANDOLENCE,FOR
     GIVE,CONGRATULATE,GRATITUDE,
     INGRATITUDE
980  DATA ILLHUMOUR,ANGER,JEALOUS
     Y,SCAN,RETALIATE,REVENGE
982  DATA MORALITY,ETHICS,RIGHT,W
     RONG,DUE,UNDUE,DUTY,IMPOSITI
     ON,RESPECT
986  DATA DISRESPECT,CONTEMPT,RID
     ICULE,APPROVAL,DISAPPROVAL,F
     LATTERY,DISPARAGE
988  DATA CURSE,THREAT,PROBITY,IM
     PROBITY,JUSTICE,INJUSTICE,SE
     LFISH,UNSELFISH
992  DATA VIRTUE,VICE,SIN,GUILT,I
     NNOCENCE,GOODPERSON,BADPERSO
     N,SENSUAL,CHASTE
998  DATA UNCHASTE,INDECENT,ASCET
     IC,TEMPERATE,INTEMPERATE,GLU
     TTON,FASTING
1002 DATA DRUNKEN,SOBER,LEGAL,IL
     LEGAL,JURISDICTION,TRIBUNAL,
     JUDGE,LAWYER,LEGAL
1006 DATA ACCUSE,JUSTIFY,ACQUIT,
     CONDEMN,PENALTY,PUNISH,PUNIS
     HMENTS,ATONE
1008 :::
1010  DATA RELIGION,GOD,MYTH,SAINT
     ,EVIL,SPECTER,HEAVEN,HELL,C
     ULTS,SCRIPTURE
1014  DATA PROPHET,THEOLUGY,ORTHO
     DOX,UNORTHODOX,SANCTITY,UNSA
     NCTITY,PEITY
1016  DATA SANCTIMONY,IMPIETY,IRR
     ELIGIOUS,WORSHIP,IDOLATRY,OC
     CULT,SORCERY,CHARMS
1022  DATA MINISTRY,CLERGY,LAITY,
     RITES,ATTIRE,CHURCH
1500 ::::::::::::::::::::::::::::
```

MARK GORDON COMPUTERS®

DIVISION OF MARK GORDON ASSOCIATES, INC.
P.O. Box 77, Charlestown, MA 02129 (617) 491-7505

COMPUTERS

Atari 800 W 16K	799 00
4K Model III	599 00
Model II 64K System	3499 00
16K Model III	879 00

DISK DRIVES

40 Track 5¼ inch drive	314 00
80 Track 5¼	544 00
4 Disk Drive Cable	39 00

PRINTERS

Centronics 730	599 00
Epson MX80	Call for price
Epson MX70	Call for price
Centronics 737	849 00
Okidata Microline 83	999 00
Okidata Microline 82	729 00
Integral Data 440G	999 00
NEC 5510 w-tractor	2695 00
Okidata Microline 80	499 00
Diablo 630	2495 00

MISC HARDWARE

Expansion int TRS-80(Ok)	269 00
Novation D-Cat Modem	166 00
16K Memory Kit	41 99
Leedex Monitor	119 00
Leedex 100G	139 00
Leedex Color Monitor	399 00
Printer Cable for above	49 00
ISO-2 Isolator	54 00
AC LINE FILTER	24 00

STORAGE MEDIA

Scotch-box 10-5¼	27 00
Memorex box 10-5¼	22 00
Plastic Storage Box	5 00

OPERATING SYSTEMS

NEWDOS by APPARAT INC	49 00
NEWDOS+ by APPARAT INC	99 00
MMS FORTH DISKETTE-PRIMER	79 95
NEWDOS 80	149 00

BUSINESS SOFTWARE FOR TRS-80 BY SBSG

Free enhancements and upgrades to registered owners for the cost of media and mailing. 30 day free telephone support. User reference on request

Fully Interactive Accounting Package. General Ledger, Accounts Payable, Accounts Receivable and Payroll Report Generating

Complete Package (requires 3 or 4 drives)	$475.00
Individual Modules (requires 2 or 3 drives)	$125.00
Inventory II (requires 2 or 3 drives)	$99 00
Mailing List Name & Address II (requires 2 drives)	$129 00
Intelligent Terminal System ST-80 III	$150 00
The Electric Pencil from Michael Shrayer	$150.00
File Management System	$ 49.00

FINE PRINT

TRS-80 is a Tandy Corporation trademark. Use of above operating systems may require the use of Radio Shack TRS-DOS. Radio Shack equipment subject to the will and whim of Radio Shack.

ORDERING INFORMATION

We accept Visa and Mastercharge. We will ship C.O.D., certified check, or money order only. There will be a 40 percent deposit required on all C.O.D. orders over $300.00. Massachusetts residents add 5 percent sales tax.
To order, call toll-free 1-800-343-5206
For information call 617-491-7505

master charge
VISA

The Company cannot be liable for pictorial or typographic inaccuracies. The above prices do not include shipping.

CIRCLE 165 ON READER SERVICE CARD

GET THE SOFTWARE THAT'S GOING PLACES. THE UCSD p-SYSTEM.™

You want a copy of the exciting software system that's going places. Professionals everywhere are using the UCSD p-System. Now, you can have it. The UCSD p-System offers: a complete software development system, your choice of languages, and a portable system that runs on your microcomputer today and tomorrow. Send in the coupon below and join the pros today. Phone orders accepted with Visa or Master Card.

Yes, I want the software system that's going places—the UCSD p-System. Here's my order:

UCSD p-System* (Version IV.0) including documentation:
- ☐ with UCSD Pascal™ Compiler $500.00
- ☐ with FORTRAN-77 Compiler $500.00
- ☐ with UCSD Pascal and FORTRAN-77 . $750.00

☐ BASIC Compiler Add-On $150.00

☐ Assemblers Package (cross-assemblers) for Z-80, 6502, 6800, 6809, 8080, 9900, Z8, PDP-11™/LSI-11™ $250.00

☐ Complete UCSD p-System WITH UCSD Pascal Documentation Set $50.00

☐ Send me more information (general)

☐ Send distributor information

☐ Send information on the availability of systems for the 6800, 6809, and/or 9900 processors

My system has: (check only one)

☐ CP/M* Version I.4

☐ CP/M Version II.0 with 128-byte sectors

☐ 8080 or Z80 processor without CP/M (requiring some assembly language programming)

☐ 6502 processor (requiring some assembly language programming)

☐ PDP-11 with ☐ RX01 ☐ RX02 (check one)

☐ LSI-11 with ☐ RX01 ☐ RX02 (check one)

NOTE: (pertaining to two items above) For availability of RK05 and RL01 disk drivers, contact SofTech Microsystems.

*System requires 48K contiguous RAM. Software is shipped on 8-inch floppy disks, and can be transferred to other formats.

☐ Check or money order enclosed ☐ Ship C.O.D. (U.S. orders only)

Calif. and Mass. residents must add applicable sales tax. For foreign shipping charges, contact SofTech Microsystems.

Ship to: _____

Address: _____

City: _____ State: _____

Zip: _____ Phone: _____

Allow six weeks for delivery.

SofTech Microsystems, Inc.
9494 Black Mountain Road
San Diego, CA 92126
Ph: 714/578-6105
TWX: 910-335-1594

SOFTECH MICROSYSTEMS
A SUBSIDIARY OF SOFTECH

(UCSD p-System and UCSD Pascal are trademarks of the Regents of the University of California. CP/M is a registered trademark of Digital Research Corporation. LSI-11 and PDP-11 are trademarks of Digital Equipment Corporation.)

CIRCLE 230 ON READER SERVICE CARD

Attention

Program Authors

Do you have an original, unpublished program that would fit into our line? We are seeking top-quality software in four application areas:

1. *Education*. We lean toward simulations and tutorials rather than drill and practice.

2. *Recreation*. Our games run the gamut from arcade simulations like Super Invasion to adventure games to board games like Backgammon to space games. We look for good graphics, user friendliness and lasting fun in games we bring to market.

3. *Personal*. We are seeking to augment our line of financial and investment analysis software and our data base packages.

4. *Professional*. Statistics, graphing, curve fitting and solar energy packages comprise the line today. We seek to broaden our offerings.

We strongly prefer that software be submitted on disk with documentation typed double spaced. We evaluate software submissions against eight criteria:

1. *Originality*.

2. *User Friendly*. Is the program easy and convenient to use?

3. *Program Polish*. Is the program well structured, clean and bug free?

4. *Internal Documentation*. Instructions and help hints complete and easy to understand?

5. *External Documentation*. Well-written and complete?

6. *Special Features*. Graphics, sound and color used effectively?

7. *Multiple levels*. Required in both games and educational packages.

8. *Marketability*.

Our royalty structure is generous and furthermore we pay an advance against royalties when the program is accepted.

Send submissions to Creative Computing Software, 39 E. Hanover Ave., Morris Plains, NJ 07950. Include return postage if you want your submission returned after evaluation.

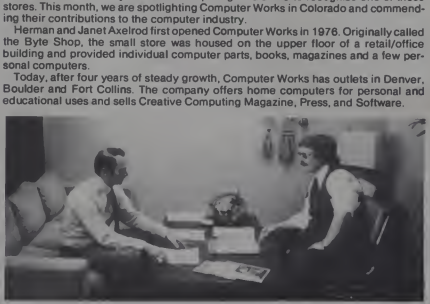
Computer Store of the Month

Computer Works, Inc.

The explosive growth of the computer industry has created a chain of computer stores over this country. Creative Computing would like to recognize one of these stores. This month, we are spotlighting Computer Works in Colorado and commending their contributions to the computer industry.

Herman and Janet Axelrod first opened Computer Works in 1976. Originally called the Byte Shop, the small store was housed on the upper floor of a retail/office building and provided individual computer parts, books, magazines and a few personal computers.

Today, after four years of steady growth, Computer Works has outlets in Denver, Boulder and Fort Collins. The company offers home computers for personal and educational uses and sells Creative Computing Magazine, Press, and Software.



Since they opened, Computer Works has maintained a consistent policy of providing personalized service for all their customers.

"We are a totally service oriented company," said Herman Axelrod. "From the moment a customer walks into the store we try to help him find a system to meet his needs. We'll install the system and teach the new owners how it can be used. If there are any problems with the equipment, our service people can handle them locally," he added.

Computer works has outlets at 3101 Walnut Street, Boulder, 970 South Oneida, Denver and 300 East Foothills Parkway, Fort Collins. Their hours are from 11 a.m. to 6 p.m., Monday through Friday. If you are in the area, stop in and see them.

creative computing

the #1 magazine of computer applications and software

CALIFORNIA

Advance Data Concepts—2280 Diamond Blvd., Concord, 94520; (415) 671-9016. 9-5 Mon-Fri. Vector-Graphic, CP/M Software Headquarters-User's Group.

D.E.S. Data Equipment Supply—8315 Firestone, Downey 90241. (213) 923-9361. 7 days. Commodore PET specialists. Hardware Software, Books, Mags, Supplies, In House Maintenance.

CONNECTICUT

Computerworks—1439 Post Rd., East Westport 06880; (203) 255-9096. 12-6 Tues-Fri, 12-9 Thu, 10-5 Sat.

FLORIDA

AMF Electronics—11158 N. 30th St, Tampa 33612; (813) 971-4072. 10-6 Mon-Sat. Apple Computer Sales & Service; TRS-80, Apple Software & Peripherals; S-100 boards, computer parts & books.

GEORGIA

Atlanta Computer Mart—5091 Buford Hwy, Atlanta 30340; (404) 455-0647. 10-6 Mon-Sat

ILLINOIS

ComputerLand/Downers Grove—136 Ogden Ave, Downers Plaza 60515; (312) 964-7762. 10-6 Mon-Sat, 10-8 Tue, Thu.

Data Domain of Schaumburg—1612 E. Algonquin Rd., Schaumburg 60195; (312) 897-8700. 12-9 Tues-Fri, 11-5 Sat. Apple, Alpha Micro, Hewlett-Packard Calculators. Largest book and magazine selection.

Farnsworth Computer Center—1891 N. Farnsworth Ave., Aurora, IL 60505; (312)851-3888. 10-8 Mon-Fri, 10-5 Sat. Apple, Hewlett-Packard series 80 systems, HP Calculators, IDS Printers.

Lilliput Computer Mart, Inc.—4446 Oakton, Skokie 60076; (312) 674-1383. M-F 10:30-8 pm, Sat 10-6. We sell Cromemco, Gimix, Bell & Howell, NorthStar and others. Starting our fifth year in business.

Video Etc.—465 Lake Cook Plaza, Deerfield 60015; (312) 498-9669; Open Everyday. Strong software support for Apple, Atari.

MASSACHUSETTS

Neeco—679 Highland Ave, Needham 02194; (617) 449-1760. 9-5:30 Mon-Fri. Commodore, Apple, Superbrain, TI 99/4.

Science Fantasy Bookstore—18 Eliot St., Harvard Sq., Cambridge 02138; (617)547-5917. 11-5 Mon-Sat, 11-8 Thur. Apple & TRS-80 games; Epyx, Microsoft, Creative Computing.

MICHIGAN

Upstate Computer Shop—629 French Rd., Campus Plaza, New Hartford 13413; (315) 733-9139. Mon—Fri 10—6, Sat 11—5. Apple—Commodore—Data General.

Computer Center—Garden City; (313) 425-2470 & West Bloomfield; (313)855-4220; Books, Magazines, Hardware and Software for Apple, Northstar, TRS-80 & PET.

NEVADA

Home Computers—1775 E. Tropicana #6, Las Vegas 89109 (702) 798-1022. 10-7 Mon-Sat. Apple, Commodore, Atari, AIM 65, (Books) Sales & Service.

NEW JERSEY

Computermook—Rt. 46, Pine Brook Plaza, Pine Brook 07058; (201) 575-9468. 10-6:30 MTWS, 10-8 Thurs., Fri. Apple/Commodore Authorized dealer.

Silent Partner—2050 Center Ave., Fort Lee 07024; (201) 947-9400; Mon-Sat 10-6. Apple/Atari/Commodore/Vector/Malibu.

Stonehenge Computer Shop—89 Summit Avenue, Summit 07901; (201) 277-1020. 10 am - 6:30 pm Mon-Sat. Apple/Bell & Howell/Commodore Authorized Dealer, Sales and Service.

Software City—111 Grand Ave., River Edge 07661; (201) 342-8788. Bus/Rec/Utility Home programs for TRS-80, Atari, Apple and PET. 10-25% off list.

NEW YORK

Programs Unlimited—20 Jericho Turnpike, Jericho, NY 11753; (516)333-2266. 10-8 Mon-Sat. The largest microcomputer software selection available.

The Computer Center—31 East 31st St., New York 10016; (212)889-8130. 10-7 Mon-Fri, 11-6 Sat, 10-8 Thur.

Upstate Computer Shop—629 French Rd., Campus Plaza, New Hartford 13413; (315)733-9139. 10-6 Mon-Fri, 11-5 Sat. Apple—Commodore—Data General.

OHIO

Abacus II—1417 Bernath Pkwy, Toledo 43615; (419) 865-1009.

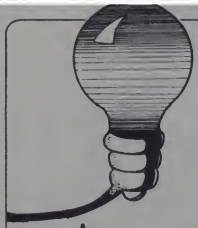
Micro Mini Computer World—74 Robinwood Ave., Columbus 43213; (614) 235-5813/6058. 11-7 Tues-Sat. Authorized Apple/Commodore dealer. Sales, Service, Business Software.

North Coast Computers—626 Dover Center, Bay Village 44140; (216)835-4345. 10-6 Mon-Sat, 10-8 Tue, Thur. Apple/Atari/Vector Graphic/Data General.

WISCONSIN

Petted—4265 W. Loom's Rd. (1-894-Hwy 36, Milwaukee 53221; (414)282-4181. 12-8 Mon-Fri, 10-4 Sat. Authorized Commodore PET, CBM, VIC dealer. Books, Magazines, Chips, etc.

To include your store in Creative Computing's *Retail Roster, call the Advertising Department at (201) 540-9168*



ucts...new products...new products...new

COMPUTERS

MULTI-PROCESSOR, MULTI-USER COMPUTER

OSM announces the Model 6500, rack mountable computer system.

The S-100 bus and CP/M compatible system is expandable from 1 to 64 users. The mainframe can accommodate up to 12 users and additional enclosures of up to

18 users each can be added. Each mainframe consists of the user processors (UP) and a master processor (MP). Each processor consists of a Z80A. 64K RAM. and serial and parallel I/O.

The system runs under OSM's CP/M compatible Multi-User System Executive (MUSE), which is written in Z80 code.

Types of disk storage available include two 8" double-density. double-sided floppies (standard). and optional 29- and 96-megabyte hard disk subsystems. System prices start at $5715.

OSM Computer Corporation. 2364 Walsh Ave.. Santa Clara. CA 95051. (408) 496-6910.

CIRCLE 336 ON READER SERVICE CARD

SMALL BUSINESS COMPUTERS

Computhink has announced two new models of its Minimax line of small computers.

The smaller of the two models. the model 50. has 86K bytes of main memory (46K user) and 1.2 megabytes on 8" dual floppy disks expandable by the addition of two more drives to 2.4 megabytes. $6950.

The second model. the model 100. has 86K bytes of main memory (46K user). and 2.4 megabytes on 8" floppy disks expandable to 4.8 megabytes. Both models also feature full track buffering for both directories and data. and optional medium resolution graphics capability. $7950.

The Minimax systems are based on the 6502 processor. Computhink. Inc.. 965 West Maude Ave.. Sunnyvale. CA 94086. (408)245-4033.

CIRCLE 337 ON READER SERVICE CARD

TERMINALS & I/O

RADIO SHACK LINE PRINTER IV

The Line Printer IV for TRS-80, is a proportionally spaced, high-density dot-matrix printer for use with word-processing applications. It can produce either 80 or 132 fixed-space characters per eight-inch line for right justification or tabular information. Both upper and lower case letters are available in all three printing modes.

Special characters available include the grave, braces, back slash and carat. In addition, Line Printer IV provides true underlining, subscripts, superscripts, fixed or proportional print, enlarged characters, bold face and forward or reverse line feeds. Backspace control, up to 126 dot positions, simplifies boldface and overprinting.

The printer can be used with roll paper, pin-feed, 9½" fan-fold or single sheets with two carbons. $999.

Available exclusively through Radio Shack stores and participating dealers and Radio Shack Computer Centers, nationwide.

DOT MATRIX PRINTER

A low cost, 80-column dot matrix impact printer has been introduced by Epson America, Inc.

The MX-70 features Epson's Micro-Nine disposable printhead and prints unidirectionally at 80 cps with a user-defined choice of 40 (double-width characters) or 80-column printing. It provides top-of form recognition, programmable line feed and form lengths, a self-test mode, and an adjustable tractor feed.

The MX-70 also features Graftrax II, a high resolution (60 dots per inch) function. The MX-70 sells for under $450.

Epson America, Inc., 23844 Hawthorne Blvd., Torrance, CA 90505. (213) 378-2220.

CIRCLE 339 ON READER SERVICE CARD

META TECHNOLOGIES

26111 Brush Avenue, Euclid Ohio 44132

CALL TOLL FREE 1-800-321-3552 TO ORDER

IN OHIO, call (216) 289-7500 (COLLECT)

FILE BOX

DISKETTE STORAGE SYSTEM

$24.95 for 5¼" disks

$29.95 . . . for 8" disks

MTC brings you the ULTIMATE diskette storage system, at an affordable price. Storing 50 to 60 diskettes, this durable, smoke-colored acrylic unit provides easy access through the use of index dividers and adjustable tabs. Unique lid design provides dust-free protection and doubles as a carrying handle.

'RINGS' & THINGS

Help prevent data loss and media damage due to improper diskette centering and rotation with the FLOPPY SAVER™ reinforcing hub ring kit. 7-mil mylar rings install in seconds. Kit is complete with centering tool, pressure ring, 25 adhesive backed hub rings and instructions.

HUB RING KIT for 5 1/4" disks . $10.95
HUB RING KIT for 8" disks $12.95
REFILLS (50 Hub Rings) $5.95

Protect your expensive disk drives and your valuable diskettes with our diskette drive head cleaning kit. The kit, consisting of a pair of special "diskettes", cleaning solution and instructions, can be used for 52 cleanings. Removes contamination from recording surfaces in seconds without harming drives.

CLEANING KIT for 5¼" drives . $24.95

PLASTIC LIBRARY CASES

(not shown)

An economical form of storage for 10 to 15 diskettes, and is suitable for your bookshelf! Case opens into a vertical holder for easy access.

5¼-inch diskette case $3.50
8-inch diskette case $3.95

Single Sided, Soft-Sectored 5¼-inch, (for TRS-80™) Mini-floppy

DISKETTES

$21.95 box of 10

These are factory fresh, absolutely first quality (no seconds!) mini-floppies. They are complete with envelopes, labels and write-protect tabs in a shrink-wrapped box.

PLAIN JANE™

DISKETTES

The Beautiful Floppy with the Magnetic Personality™

Thousands of people have switched to this low-cost alternative. These quality diskettes are packaged in a plain white box . . . no fancy printing, fancy names or fancy labels, not even our own (labels cost money). Trust us.

PLAIN JANE™ Diskettes $21.95
10 boxes of 10 (each box)$21.50

VERBATIM'S PREMIUM DISKETTES AT AFFORDABLE PRICES

DATALIFE™

Seven data-shielding improvements mean greater durability and longer data life. These individually, 100% error-free certified diskettes feature thicker oxide coating, longer-lasting lubricant, improved liner, superior polishing and more! Meets or exceeds IBM, Shugart, ANSI, ECMA and ISO standards. Reinforcing HUB RINGS help prevent data loss and media damage, reducing errors.

Buy the best . . . buy DATALIFE™

VERBATIM DATALIFE™ DISKETTES

5¼-inch (box of 10)
MD525-01 $26.95
10 boxes of 10 (each box)$25.95

8-inch FLOPPIES
Single-Density, FD34-1000 . . $33.95
Double-Density, FD34-8000 . $43.95

MICROPARAPHERNALIA

DISKETTES (box of ten)

5¼" PLAIN JANE™ $21.95
5¼" DATALIFE™ MD 525-01 . . $26.95
8" DATALIFE™ FD34-1000 . . . . $33.95
8" DATALIFE™ FD34-8000 . . . . $43.95

NEWDOS by APPARAT

NEWDOS/80 ★ SPECIAL ★ . . . $129.95
NEWDOS + to
NEWDOS/80 UPGRADE . . . . . CALL
NEWDOS + with ALL UTILITIES
35-track $69.95
40-track $79.95

BOOKS

TRS-80™ DISK
AND OTHER MYSTERIES . . $19.95
MICROSOFT™ BASIC DECODED $29.95
1001 THINGS TO DO WITH YOUR
PERSONAL COMPUTER . . . . $ 7.95

Let Your TRS-80™ Test Itself With

THE FLOPPY DOCTOR & MEMORY DIAGNOSTIC

by THE MICRO CLINIC

A complete checkup for your Model I. THE FLOPPY DOCTOR completely checks every sector of 35- or 40-track disk drives. Tests motor speed, head positioning, controller functions, status bits and provides complete error logging. THE MEMORY DIAGNOSTIC checks for proper write/read, refresh, executability and exclusivity of all address locations. Includes both diagnostics and complete instruction manual.

SYSTEM DIAGNOSTICS $19.95

An improved version of the SYSTEM DIAGNOSTICS above. Designed for single or double density, 35-, 40-, 77-, or 80-track disk drives. Includes new and modified tests. Features THE FLOPPY DOCTOR, Version 3.0.

SYSTEM DIAGNOSTICS-V3 . . $24.95

CALL FOR INFORMATION ON OTHER PRODUCTS

TRS-80 is a trademark of the Radio Shack Division of Tandy Corporation. DATALIFE is a trademark of VERBATIM. PLAIN JANE, AIDS-I, AIDS-III, CALCS-III, CALCS-IV, MERGE-III are trademarks of MTC
© 1981 by Metatechnologies Corporation, Inc.

MOST ORDERS SHIPPED WITHIN ONE BUSINESS DAY

Products damaged in transit will be exchanged.

PRICES IN EFFECT May 1, 1981 THRU May 31, 1981.

Prices, Specifications, and Offerings subject to change without notice.

8105

WE ACCEPT
- VISA
- MASTER CHARGE
- CHECKS
- MONEY ORDERS
- C.O.D

- Add $3.00 for shipping & handling
- $3.00 EXTRA for C.O.D.
- Ohio residents add 6½% sales tax.

CIRCLE 228 ON READER SERVICE CARD

INTELLIGENT LETTER-QUALITY PRINTER

The next generation of the NEC Spinwriter is available in Intersell's Sellum I. An intelligent, letter-quality printer, the Sellum I enhances the NEC print mechanism with an interface board containing on-board Z80 microprocessor, 16K RAM and 4K additional ROM capacity, multiple interface compatibility and full data handshaking signals.

Standard features include automatic bi-directional printing, switch/software selectable baud rate and logic seeking capabilities, which allow a maximum throughput of up to 700 words per minute.

The 650-character buffer and optional 16K buffer for printer spooling allow simultaneous data entry and printing.

The Sellum I is compatible with any computer utilizing RS-232C serial, Centronics-type or 20ua current-loop interfaces, and will support both keyboard and additional firmware. $3495.

Intersell, 465 Fairchild Dr. #214, Mountain View, CA 94043, (415) 964-5460.

CIRCLE 340 ON READER SERVICE CARD

LETTER QUALITY PRINTER

Zenex Business Systems Inc. announces a letter quality, daisy wheel printer/typewriter, the Zenex 121.

The Zenex 121 is based on the Olivetti electronic typewriter and features an electronic keyboard, automatic correction, automatic return, paragraph indentation centering, and alphabetic and decimal tabulation.

The RS-232C interface is standard. Other interfaces are available on request.

Zenex Business Systems Inc., 1215 Meyerside Dr., Unit 2, Mississauga, OT. L5T 1H3 Canada. (416) 671-2199.

CIRCLE 341 ON READER SERVICE CARD

DAISY WHEEL PRINTERS

The V300 Series Daisy Wheel Printers are recent additions to Vista Computer Company's line. The series includes 25 cps and 45 cps models.

Both are impact printers which produce letter quality printing using standard Diablo or Qume-type 96-character print wheels. Also, both printers can accomodate paper widths up to 15 inches and can print up to 136 columns.

The V300 is available with either an industry standard Centronics parallel interface or RS-232C.

The V300-25 is priced at $1,895 and the V300-45 at $2,195.

Vista Computer Company, 1317 E. Edinger Ave., Santa Ana, CA 92705, (714) 953-0523.

CIRCLE 342 ON READER SERVICE CARD

FREE your keyboard — interact directly with the screen. Why waste time typing? Use a 3-G Light Pen.

- In his business, Al Zenkar of Zenker Dental labs in Penndel, Pennsylvania uses our pens for **data entry**. Harry Lee of Pittsfield, Massachusetts uses the pen to **select telephone numbers** to be dialed by his computer. Thorwald Esbensen of Micro-Ed, Inc. in Minneapolis, Minnesota writes **education software** for the 3-G Light Pen. Swiss Air Dispatch at Kennedy Airport in New York uses our pens to speed up its **business operations**. Dr. Richard Kerns of East Carolina University incorporates our pen in a demonstration with a voice synthesizer to **teach** his students how to use computers. In Holland Johan Smilde uses a 3-G Light Pen to experiment with **graphics**.
- These people have discovered the benefits of using a 3-G Light Pen. Wouldn't a 3-G Light Pen make your system more versatile and more functional? Yes, of course it would!
- **Don't Wait** — order your pen today and receive:
  1) 3-G Light Pen
  2) Demonstration cassettes (with Professional TRS-80, PET and Apple)
  3) Sample program listing
  4) Complete documentation and instructions
  5) Other Light Pen software and games available
- **NO ASSEMBLY NECESSARY. READY TO PLUG IN AND USE.**
- Complete documentation so you can write your own program in BASIC. No machine language coding necessary.
- All 3-G Professional models **plug into machine ports.** Economy model plugs into cassette and batteries are included.

Mail Coupon or Call Today for Immediate Delivery

3-G Company, Inc. Dept. CC
Rt. 3, Box 28A, Gaston, OR 97119
(503) 662-4482

Remember: 3-G offers a 30-day unconditional Money back GUARANTEE

TRS-80 Economy	TRS-80 Professional	PET Professional	Apple Professional
$24.95	$39.95	$37.95	$39.95

Yes, I want to make my computer more versatile. Rush me _____ 3-G Light Pens. (Add $1.50 for mailing and handling — $6.00 foreign.)

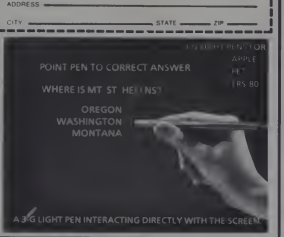
Enclosed is ____ check or money order ____ Master Charge ____ Visa

Card No. _____ Exp. date _____

NAME _____

ADDRESS _____

CITY _____ STATE _____ ZIP _____



A 3-G LIGHT PEN INTERACTING DIRECTLY WITH THE SCREEN

CIRCLE 237 ON READER SERVICE CARD

Complete 6-year Index

Find it Fast!

Our new 6-year cumulative index lists every article, program and review that has appeared in Creative Computing from its inception in November 1974 to December 1980. The index lists not only the issue in which an article appeared but a cross reference to The Best of Creative Computing, Volumes 1, 2 and 3. It also lists all the articles in ROM magazine.

Articles are classified by subject area and listed by title and author. Over 3500 separate items are included. Note: the index does not include a cross reference to author.

Looking for information on computers in education? You'll find 76 articles and 155 application programs. How about art and graphics? You'll find 44 entries. In the market for a computer? You find 82 hardware evaluations and 94 of software.

Price of this huge index is just $2.00. Even if you've been a reader for only a year or two you'll find the index of great value. Orders yours today.

creative computing
Morris Plains, NJ 07950

DISK SYSTEMS

5-MEGABYTE ADD-ON WINCHESTER DISK SYSTEMS

Corvus Systems has announced a family of 5-megabyte Winchester disk systems. The family members are add-ons, and fill the gap that has long existed between 1-Mbyte and 10-Mbyte end-user disk add-ons.

The 5-Mbyte drives are available to interface to a wide variety of microcomputers including TRS-80 models I and II, Apple II and III, Altos, Alpha Micro, Intertec Superbrain, NEC PC-8001, and Ontel, as well as all S-100 bus-based computers running under CP/M or Oasis; currently under development are interfaces for the TRS-80 model III, PET, Zenith Z-89, Atari, and HP-85 machines. $3750.

Corvus Systems, 2029 O'Toole Ave., San Jose, CA 95131, (408) 946-7700.

CIRCLE 343 ON READER SERVICE CARD

DISK DRIVE FOR TRS-80 MODEL III

Percom Data Company announces mini-disk (5 1/4") storage systems for the TRS-80 Model III computer.

Systems may be ordered with either 40- or 80-track drives that are rated for both double- and single-density operation. Using Percom drives, a Model III owner can expand his computer with from one to four drives, adding from 102 Kbytes to almost 1.5 Mbytes of on-line formatted storage capacity.

The complete initial internal drive system sells for $749.95 in the 40-track version and $914.95 in the 80-track version.

Percom Data Company, 211 N. Kirby, Garland, TX 75042, (800) 527-1592.

CIRCLE 344 ON READER SERVICE CARD

No TRS-80 ® Word processor

is complete without

PROOFREADER™

Let your **TRS-80** proofread your **SCRIPSIT**, Electric Pencil or other documents. **Proofreader** uses a 38,000 word dictionary and lists misspelled words on a file, screen, or printer. (Requires 32K, 1 disk. **MODEL-I** **$34.00**

RATFOR

Rational Fortran preprocessor allows structured programming using Fortran. One of the best versions available, with full manual. (Requires Fortran, 48K, 2 disks, **MODEL-I** **$49.00**

SOFT-TOOLS are professional quality software tools developed for the **TRS-80** by a PhD in Computer Science. Versions for **MODEL-III** available soon.

Order Postpaid: **SOFT-TOOLS**
MHE Box 14
Prices subject to change Tijeras, NM 87059

CIRCLE 282 ON READER SERVICE CARD

At last --- the DYNATYPER TYPEWRITER INTERFACE!

Turn your electric typewriter into a low cost, high quality hard copy printer. 1 year warranty

DYNATYPER – Rochester Data's patented* Computer/Typewriter interface is the industry standard for typewriter output.

- 2 minutes to initially install and 5 seconds to remove or replace.
- You do not have to modify your typewriter. All factory warranties and maintenance agreements on your typewriter will be honored.
- Compatible with all power carriage return typewriters having standard U.S. keyboard. The Dynatyper works with Selectrics (model 1) and most non-Selectrics (model 2). Please specify. Typewriter conversion between models takes 2 minutes and the kit (17 plungers) is available for a nominal fee.
- The Dynatyper is compatible with all major word processing software. (Scripsit, Pencil, Applewriter, Easywriter, Magic Window, Visi-calc CCADBM, Supertext, Write On)
- Interfaces available for TRS-80, APPLE, PET/CBM, OSI, Northstar, HP-85, H-89. Weighs only 3 lbs. Extremely portable.
- Delivery: Stock to two weeks. Price $499 for complete system. F.O.B. Rochester, Domestic. VISA and Master Card accepted. Call Ken Yanicky at 716-244-7804

*Pat. Pending
Registered ™ Of Rochester Data

ROCHESTER DATA incorporated
3000 Winton Road South, Rochester, N.Y. 14623

CIRCLE 256 ON READER SERVICE CARD

Fight Big Government

buy the improved

Tarbell CP/M™ Database System

- Variable-length fields.
- Field names may be of any length, and may include spaces.
- Sequential or Random Files.
- Optional Index file.
- Runs under CBASIC™.

Includes these Interactive Programs:

DBSETUP	creates a file
DBENTRY	for entering data
DBUPDATE	for changing files
DBQUERY	for accessing data
DBLABEL	prints mailing labels
DBLETTER	prints irate letters

Non-Database Programs Included:

INV	Inventory Control
FLIGHT	Cross-country flight planning

CP/M is a trademark of Digital Research
CBASIC is a trademark of Compiler Systems

$50 price includes sources on disk.

Fairbell Electronics
950 DOVLEN PLACE, SUITE B
CARSON, CA 90746
(213) 538-4251 • (213) 538-2254

CIRCLE 202 ON READER SERVICE CARD

20 MEGABYTE INTELLIGENT DISK SYSTEM

Newest addition to a line of intelligent peripherals from Corvus is a 20-megabyte version of the Winchester disk system.

Like the 10 MB model, the 20 MB disk is compatible in both hardware and software with the Apple II and III, TRS-80 Models I and II, DEC LSI-11, Alpha Micro, Altos, SuperBrain, NEC, PET, Atari, Zenith and several S-100 bus models.

The system consists of three elements: an 8" IMI-7720 Winchester disk drive, a Corvus Z-80 based intelligent disk contoller capable of supporting four drives, and an intelligent personality module for each computer. $6450.

Corvus Systems, Inc., 2029 O'Toole Ave., San Jose, CA 95131. (408) 946-7700.

CIRCLE 345 ON READER SERVICE CARD

PERIPHERALS

GRAPHICS TABLET

The Hewlett-Packard Personal Graphics System based on the Series 80 personal computer, now incorporates a graphics tablet for creation and manipulation of graphics on the display.

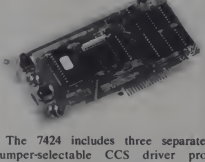
Software that comes with the HP 9111 Graphics Tablet gives it capabilities in three main areas: tracing and digitizing existing designs or logos, creating new designs, and measuring areas and lengths of lines directly off maps or charts. $2050.

Inquiries Manager. Hewlett-Packard Company. 1507 Page Mill Rd., Palo Alto, CA 94304.

CIRCLE 346 ON READER SERVICE CARD

CALENDAR/CLOCK MODULE

The Model 7424 Calendar/Clock Module provides Apple II users with real time counting. The module, featuring a crystal-controlled MSM5832 Clock chip, counts seconds, minutes, hours, days of the week and month, months, and years. A battery may be installed to maintain uninterrupted time counting during power-down or power outages.



The 7424 includes three separate, jumper-selectable CCS driver programs, plus space for user-written drivers, onboard in 1K of EPROM. $125.

California Computer Systems, 250 Caribbean Dr., Sunnyvale, CA 94086. (408) 734-5811.

CIRCLE 347 ON READER SERVICE CARD

asap computer products, inc.

NEW LOCATION
1198 E. Willow Street
Signal Hill, CA 90806
Toll Free (800) 421-7701 Outside Calif.
(213) 595-6431 Inside Calif.

ORDERING INFO
Name, address, phone
Ship By: UPS or Mail
Shipping Chrg. Add $2.50 up to 2 lbs. (UPS Blue)
U.S. Mail Add $1.50 (U.S. Only)
($25.00 Minimum Order)

TERMS
We Accept Cash, Check, Money Orders, Visa & Master Charge (U.S. Funds Only)
Tax: 6% Calif. Res.
COD's & Terms Available on Approval (School PO's Accepted)

S.D. SYSTEMS

EXPANDORAM I	16K	$239.00
2MHz DYNAMIC	32K	265.00
RAM BOARD	48K	289.00
KITS	64K	315.00
EXPANDORAM II	16K	$250.00
4MHz DYNAMIC	32K	275.00
RAM BOARD	48K	300.00
KITS	64K	325.00

AMPEX
DIALOGUE 80
CRT VIDEO TERMINAL
Reg. Price $995.00
Console has non-glare 12-inch diagonal display screen. Brightness control enhances clarity. Detached typewriter-style key board designed for optimum operator comfort and usability.
OUR LOW ASAP DISCOUNT PRICE
$945.00

MICROBYTE 32K STATIC RAM BOARD
$500.00
•Fully S100 bus compatible IMSAI, SOL, ALTAIR ALPHA MICRO
•Uses Intel low-power 2141L-4 4Kx1 Static RAM
•2 MHz or 4 MHz operation
•Each 4K bank addressable to any 4K slot within a 64K boundary
•4K hardware or software selectable
•Will operate with or without front panel
•Low power consumption 800mA
•Fully warranted for 120 days from date of shipment

2708/450 ns
1K x 8 EPROM
$5.25 ea.
OR
8/$40.00

2716/5 VOLT
2K x 8 EPROM
$8.00 ea.
MAJOR MFG.

2114L-2
(200 NS) 1K x 4 STATIC RAM

1-16	$3.25
17-49	$3.15
50-99	$2.95
100 Up	$2.85

TELEVIDEO
CRT/TERMINALS

MODEL #	PRICE
TVI 912B	$ 749.00
TVI 912C	$ 769.00
TVI 920B	$ 825.00
TVI 920C	$ 825.00
TVI 950C	$1025.00

IN STOCK
90 DAY WARRANTY

SOFTWARE for the APPLE, PET, TRS-80 SYSTEMS

ITEM	SYSTEM	PRICE
VISICALC	APPLE	$120.00
VISICALC	PET	$159.00
VISICALC	ATARI	$159.00
DESK TOP PLAN	APPLE	$ 85.00
CCA DATA MGMT.	APPLE	$ 85.00
CCA DATA MGMT.	TRS-80	$ 59.00
MICROCHESS 1.5	TRS-80	$ 17.95

HITACHI (MONITORS)

MODEL #	SIZE	PRICE
VM910	9" B&W	$210.00
VM906	9" B&W	$265.00
VM129	12" B&W	$340.00
VM17	17" B&W	$360.00
CM13L	13" Color	$399.00

4116's
(200 NS.)
Apple, TRS-80, Heath
8 for $22.00

16- 49	$2.60
50- 99	$2.50
100-499	$2.40
500 Up	$2.25

1 YR. WARRANTY

DISKETTES (MEDIA)
BOX OF 10

VERBATIM MD525-01 5¼" SOFT SECTOR	$26.50
MEMOREX 3401 5¼" SOFT SECTOR	$24.00
MAXELL FD-2D DS-DD SOFT SECTOR	$65.00

NEW 16K RAM Module for Atari 800
COMPUTER SYST.
$89.95
mfg. by asap

SHUGART SA 801R
8" SGL/SIDED SGL/DBL DENSITY FLOPPY DISK DRIVE
CALL FOR PRICE & DELIVERY

QUME DT-8 DISK DRIVE
•Double-Sided/Single-Double Density
•IBM-compatible/1.2 Mbytes per Disk
•Fast—3 ms. Track to Track
•154 Tracks/Daisy Chain 4 Drives
•IBD Standard Write Protect
•Programmable Door Lock
CALL FOR PRICE & DELIVERY

100 PIN IMSAI
GOLD / S-100
SOLDERTAIL CONNECTORS
$2.40 each
OR
10/$2.25 each

MICROPROCESSORS

PART #	PRICE
8080A	$ 2.50
Z80A	$ 8.95
Z80A CTC	$ 7.95
Z80A DART	$13.95
Z80A SIO	$24.95
8255 ACS	$ 5.95
8257 ACS	$ 8.95

CIRCLE 109 ON READER SERVICE CARD

MAGAZINES, NEWSLETTERS

SUPERBRAIN NEWSLETTER

SuperLetter is a monthly newsletter for owners of Intertec SuperBrain computers.

It features technical news, operating tips, accessory ideas, and customized software designed for the SuperBrain computer. Sections include: Technical Corner, Question and Answer Forum, Factory News, Guest Interview, and SuperClassifieds.

Abrams Creative Services, 369 S. Crescent Dr., Beverly Hills, CA 90212 (213) 277-1588.

POCKET COMPUTER NEWSLETTER

The *Pocket Computer Newsletter* reports on news and product reviews concerning pocket and hand-held computers, such as the Radio Shack TRS-80 Pocket Computer.

Published ten times per year, the newsletter also carries such features as programming tips, operating timesavers, tutorial articles, notes on customizing units, programming short cuts, listings of practical programs, technical information and application forums.

The ten issue subscription price is $20 in the U.S., $24 in Canada, $30 elsewhere. A sample issue is $2.

The *Pocket Computer Newsletter*, P.O. Box 232, Seymour, CT 06483.

MAGAZINE FOR PERSONAL SOFTWARE USERS

Uptrend is a magazine written and designed to help business and professional personal computer users increase their productivity with Personal Software programs such as VisiCalc, Desktop Plan and CCA Data Management System. It includes "how-to" articles on program usage, questions and answers, information on the programs, letters from users, and interviews with people who are applying the programs in a particularly effective way.

The initial mailing was to owners of Personal Software programs who have returned their warranty cards. Copies of the new publication also will be available at computer stores which market Personal Software products.

Personal Software, Inc., 1330 Bordeaux Dr., Sunnyvale, CA 94086.

CIRCLE 351 ON READER SERVICE CARD

COLOR COMPUTER NEWSLETTER

REMarkable Software announces *Color Computer News*, a publication devoted to users of Radio Shack's Color Computer. In addition to being a source for news concerning the color computer it will feature software, tips and helps, and provide a forum for Color Computer users.

Publication will be bi-monthly. Subscription rate is $9 per year or $2 per issue.

REMarkable Software, P.O. Box 1192, Muskegon, MI 49443; (616)759-8252.

MAGAZINE FOR TI 99/4

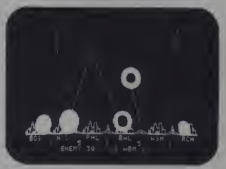
99'er Magazine is a bimonthly magazine devoted to coverage of the Texas Instruments TI-99/4 Home computer and other TMS9900 microprocessor-based personal computer systems. It contains tutorial articles, software, book and product reviews, opinions and news items, plus a question and answer technical forum for present users and others interested in 16-bit personal computing.

The subscription rate is $15 for one year ($18 Canada; $25 foreign surface; $40 foreign air) from 99'er Magazine, Emerald Valley Publishing Co., 2715 Terrace View Dr., Eugene, OR 97405. (503) 485-8796.

TWO EXCITING GAMES FOR THE APPLE II® OR II plus®

ABM by silas warner

Invader and Asteroids move over ABM has arrived! Command your launch sites to fire 1 and 5 kiloton anti-ballistic missiles (ABMs) Save the East Coast from increasingly fierce Enemy nuclear attack. Position your target crosshairs to blast the green streamers before they fireball your cities—or worse—split into multiple warhead MIRVs turning the entire coast into a thundering specter of destruction. Hi-res color graphics, sound, high score to date memory, paddle or joystick control On disk, requires Applesoft ROM ($24.95)



GLOBAL WAR by alan boyd

A challenging strategy game for 2 to 9 players. Your 'War Room' features a detailed map of the earth plus territorial occupation status and invasion strategy displays. Players are assigned armies and territories and the war begins. The computer battle simulator calculates the results of each invasion. Occupy all countries and you are the Winner! Games may be saved on disk to be continued later. On disk, requires 48K and Applesoft ROM ($24.95)

available now at your local computer store

MUSE SOFTWARE™

Apple II is a trademark of Apple Computer Corp.

330 N. CHARLES STREET
BALTIMORE, MD 21201
(301) 659-7212

CIRCLE 226 ON READER SERVICE CARD

Dealer Inquiries Welcome

APPLICATIONS SOFTWARE

BUSINESS

A **General Business Bookkeeping System** for Ohio Scientific computers includes programs for payroll, inventory, accounts payable and receivable, job costing, purchase orders and general ledger with reports. The system is Level 3, Network and multi-dimensional compatible. Data Access Management Service, 3320 Rivers Ave., Charleston, SC 29405. (803) 554-7005.

CIRCLE 354 ON READER SERVICE CARD

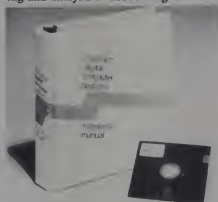
An **Accounts Receivable System** from Taranto & Associates is designed exclusively for use as a Balance Forward System. It is a high speed, high volume system capable of handling up to 2000 customers and 11,000 monthly transactions. It produces aged statements and features a full service charge facility. $399. Taranto & Associates, Inc., P.O. Box 6073, 121B Paul Dr., San Rafael, CA 94903. (415) 472-2670.

CIRCLE 355 ON READER SERVICE CARD

National Software Marketing announces an **integrated accounting package** for the TRS-80 Model II single disk system with 132-column printer. It includes general ledger, accounts payable and accounts receivable. $50. National Software Marketing Inc., Box 6195, Hollywood, FL 33021. (305)625-6062.

CIRCLE 358 ON READER SERVICE CARD

Heath Company has released two business packages through its Softstuff line. **General Ledger II** includes programs to facilitate the entry, maintenance, reporting and analysis of accounting data. It is



available on 5 1/4" disk for use with the Heath Disk Operating System or Heath Standard CP/M. $124.95. Also available for use with HDOS systems is a Small Business Inventory Program $69.95. Heath Company, Benton Harbor, MI 49022.

CIRCLE 357 ON READER SERVICE CARD

Trend-Spotter is a business graphics and analysis system for Apple II Plus. It will generate and read VisiCalc-compatible files. $275. Software Resources, Inc., 44 Brattle St., Cambridge, MA 02138. (617)491-6396.

CIRCLE 358 ON READER SERVICE CARD

LMA, Inc. announces Version V of their **Payroll System** for use on the Apple II Plus. It is available in both single- and dual-disk drive configurations, and performs full payroll functions for up to 45 or 150 employees. $299. LMA, Inc., 684 Haddon Ave., Collingswood, NJ 08108.

CIRCLE 359 ON READER SERVICE CARD

Accounting Plus is a general account package that offers general ledger and accounts receivable and payable. Written in Apple Basic and assembly language, the program emulates CP/M. $995. Systems Plus, 3975 East Bayshore, Palo Alto, CA 94303. (415)969-7047.

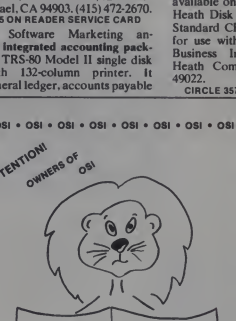
CIRCLE 360 ON READER SERVICE CARD

Business System V is a package for the medical professional who owns an Apple. The system includes five modules which handle patient records, appointment scheduling, private patient billing, insurance claims, internal bookkeeping and audit, and statistical analysis. $450. CompuSoCo, 25251 Via Roble, P.O. Box 2325, Mission Viejo, CA 92690.

CIRCLE 361 ON READER SERVICE CARD

• OSI • OSI • OSI • OSI • OSI • OSI • OSI • OSI • OSI • OSI • OSI •

ATTENTION! OWNERS OF OSI



This 96-page workbook introduces the fundamentals of OSI BASIC and explains its characteristics, limitations and usefull features. It also discusses control and logic and contains many sample programs and exercises. Just $5.95.

See your dealer or write:

TIS
P.O. Box 921, Dept. CC
Los Alamos, NM 87544

Add $2.00 ($5 foreign orders) shipping and handling

VISA

• OSI • OSI • OSI • OSI • OSI • OSI • OSI • OSI • OSI • OSI • ISO

CIRCLE 193 ON READER SERVICE CARD

TERMINALS FROM TRANSNET

PURCHASE PLAN • 12-24 MONTH FULL OWNERSHIP PLAN • 36 MONTH LEASE PLAN

	DESCRIPTION	PURCHASE PRICE	PER MONTH 12 MOS	24 MOS	36 MOS
DEC	LA36DECwriter II	$1,095	$105	$ 58	$ 40
	LA34 DECwriter IV	995	95	53	36
	LA34 DECwriter IV Forms Ctrl.	1,095	105	58	40
	LA120 DECwriter III KSR	2,295	220	122	83
	LA120 DECwriter III RO	2,095	200	112	75
	VT100 CRT DEScope	1,595	153	85	58
	VT132 CRT DEScope	1,995	190	106	72
TEXAS INSTRUMENTS	TI745 Portable Terminal	1,595	153	85	58
	TI765 Bubble Memory Terminal	2,595	249	138	93
	TI783 Portable KSR, 120 CPS	1,795	172	93	63
	TI785 Portable KSR, 129 CPS	2,395	230	128	86
	TI787 Portable KSR, 120 CPS	2,845	273	152	102
	TI810 RO Printer	1,995	192	102	69
	TI820 KSR Printer	2,195	211	117	80
DATAMEDIA	DT80/1 CRT Terminal	1,695	162	90	61
	DT80/5 APL CRT	2,095	200	112	75
	DT80/5L APL 15" CRT	2,295	220	122	83
LEAR SIEGLER	ADM3A CRT Terminal	875	84	47	32
	ADM31CRT Terminal	1,450	139	78	53
	ADM42 CRT Terminal	2,195	211	117	79
HAZELTINE	1420 CRT Terminal	945	91	51	34
	1500 CRT Terminal	1,095	105	58	40
	1552 CRT Terminal	1,295	125	70	48
TELEVIDEO	920 CRT Terminal	895	86	48	32
	950 CRT Terminal	1,075	103	57	39
NEC SPINWRITER	Letter Quality, 55/15 RO	2,895	278	154	104
	Letter Quality, 55/25 KSR	3,295	318	175	119
QUME	Letter Quality KSR, 55 CPS	3,395	326	181	123
	Letter Quality RO, 55 CPS	2,895	278	154	104
HEWLETT PACKARD	2621A CRT Terminal	1,495	144	86	54
	2621P CRT Terminal	2,050	255	142	96
CENTRONICS	730 Desk Top Printer	715	69	39	26
	737 W P Desk Top Printer	895	86	48	32

FULL OWNERSHIP AFTER 12 OR 24 MONTHS • 10% PURCHASE OPTION AFTER 36 MONTHS

ACCESSORIES AND PERIPHERAL EQUIPMENT
ACOUSTIC COUPLERS • MODEMS • THERMAL PAPER • RIBBONS • INTERFACE MODULES • FLOPPY DISK UNITS

OTHER POPULAR TERMINALS, COMPUTER PERIPHERALS AND COMPUTERS AVAILABLE

TRANSNET CORPORATION
1945 ROUTE 22 • UNION, N.J. 07083 • (201) 688-7800
TWX 710-985-5485

CIRCLE 181 ON READER SERVICE CARD

The time has come for computers to talk and listen

COGNIVOX series VIO, the affordable voice I/O peripherals

PET — TRS-80 — SORCERER

Speech Recognition and Voice Response need no longer mean esoteric concepts and expensive hardware. COGNIVOX series VIO is a family of voice input and output peripherals for personal computers that are easy to use and have excellent software support. COGNIVOX can be trained to recognize words or short phrases from a vocabulary of up to 32 words of your choice with an accuracy of up to 98% and it will talk back with up to 32 different words. It can also play music and create sound effects. COGNIVOX requires at least 16K of RAM in your computer. If your computer has less memory or if you are only interested in recognition, ask us about our SR-100 series of voice input peripherals. COGNIVOX series VIO comes complete with microphone amplifier and speaker, cassette with software and extensive manual. It costs only **$149** (add $5 for shipping and handl in US. 10% of order overseas. CA res. add 6% tax). Has immediate delivery and 120 day limited warranty. Write for more information giving us the make and model of your computer.

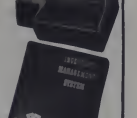
VOICETEK (805) 685-1854
Dept C, P.O. Box 388, Goleta, CA 93116

CIRCLE 190 ON READER SERVICE CARD

XtraSoft

means Business

for the
Heath & Zenith Systems
at participating Heathkit retail outlets



INVENTORY MANAGEMENT &

A truly professional automated inventory system for the small business. 17 fields of information on each item. Sales history is 999 999 999 99. Direct on-line sales/returns and orders/receipts entry, providing automatic inventory adjustment. Status, Sales History, Re Order, Physical Reconciliation, and selective sum mation reports.

POINT OF SALE SYSTEMS

A versatile sales entry system invoking single minded s POS systems. Optional cash drawer allows cash cash register replacement. Daily Sales, Salesperson and Price Exception Reports. Short sales ticket or con tinuous form invoicing. IMS integration allows auto price look up, new stock warning, and automatic inventory on hand and sales history adjustment.

Both systems menu driven with full pose entry, on screen instructions, error detection and recovery and over 200 pages of documentation, all packaged in handsome 3 ring embossed binders. Both systems can operate stand alone or fully integrated with each other. Requires Heath/Zenith H8 H19 or H-(89) HOOS. Microsoft BASIC 48K RAM and 132 column line printer. One 5 1/4 drive for stand alone POS, two drives for IMS, and 3 drives for integrated IMS / POS.

System / IMS or POS $199.95 ea Documentation only $20.00 ea

Systems will be available on 8 drives and CP/M. For information on currently available system configurations and our full product line, contact

MEMOREX DISKETTES
10 for 429.95 +
$1.50 handling

Xtra Soft
PROFESSIONAL SOFTWARE DEVELOPMENT
P.O. Box 91063, Louisville, KY 40291
HEATH & ZENITH Are Registered Tm's Of HEATH & ZENITH CORP.

CIRCLE 192 ON READER SERVICE CARD

Tips For Your Chips

Get the maximum use and enjoyment from your micro with these popular paperbacks

DATA FILE PROGRAMMING IN BASIC

LeRoy Finkel & Jerald R. Brown

With your own microcomputer, minimal knowledge of BASIC, and this easy-to-use guide, you can learn how to use data files to keep track of billings, customer inventory, and expenses, maintain mailing lists, process numerical and statistical information, and much more. Sample programs and lots of practical advice assist you every step of the way. The guide uses the most popular variants of BASIC, TRS-80 BASIC and Microsoft BASIC-80. An extensive appendix covers BASIC for the Northstar computer

0 471 08333-X March 1981
approx. 320 pp. $9.95 (tent.)

Files, fun, and fancy functions plus practical applications

MORE TRS-80 BASIC™

Don Inman, Ramon Zamora & Bob Albrecht

This exciting new interactive guide to programming in TRS-80 Level II BASIC teaches scores of practical applications—both recreational and educational. You'll get a clear demonstration of different methods to display graphics; tiles handling techniques applied to both cassette and disk files; plus animation, games, and fun.

0 471 08010-1 April 1981
approx. 300 pp. $8.95 (tent.)

Get maximum power from your micro by using assembly language

INTRODUCTION TO 8080/8085 ASSEMBLY LANGUAGE PROGRAMMING

Judi Fernandez & Ruth Ashley

Use your microcomputer to write fast, sophisticated, complex programs with the help of this guide, the only self-instructional book of its kind. You'll learn what machine language is, how to perform routine operations, input/output, conditional commands, machine language logic, stack routines, and more. Sample programs illustrate every technique and concept.

0 471 08009-8 April 1981
approx. 300 pp. $8.95

Wiley Self-Teaching Guides also teach BASIC, COBOL, FORTRAN, Job Control Language, Flowcharting, and other computer skills.

How to perform complex, sophisticated operations with your micro

8080/Z80 ASSEMBLY LANGUAGE Techniques For Improved Programming

Alan R. Miller

Now advanced and intermediate programmers can get the most response their micro is capable of generating with the help of this complete guide to programming the 8080 and Z80 microprocessors. Learn assembly language swiftly and easily by developing a powerful system monitor in a step-by-step, top-down approach. Ten indispensable appendices contain all the necessary material to write 8080 or Z80 assembly language programs

0 471 08124-8 Jan. 1981
approx. 224 pp. $9.95

Implement all functions provided by CP/M with this working tool

USING CP/M™

Judi N. Fernandez & Ruth Ashley

A complete, detailed introduction to the use of the Control Program/Microcomputers software package for maximum capability and efficiency with any hardware.

"A marvelous addition to the CP/M literature. I only wish that I had had the book when I was starting out!"
—Alan R. Miller, *New Mexico Tech* & Software Editor, *Interface Age*

0 471 08011-X 1980 243 pp. $8.95

JOHN WILEY & SONS, Inc.
605 Third Avenue
New York, N.Y. 10158
In Canada: 22 Worcester Road
Rexdale, Ontario

Prices subject to change without notice 2-1017

CIRCLE 241 ON READER SERVICE CARD

Super Disk for the TRS-80 Model I contains 48 programs designed to help managers, accountants, investors and students in solving a variety of problems. $19.95. National Software Marketing, Inc., P.O. Box 6195, Hollywood, FL 33021.
CIRCLE 362 ON READER SERVICE CARD

The TRS-80 **Point of Sale System** for small retail stores is designed to act as an electronic cash register that updates inventory with each sale. The program runs on a 48K Model I with a disk drive and printer. Each system is customized for a specific retail business. $398. Mayflower Computer Company. P.O. Box 496, Naperville, IN 60566. (312)420-8266.
CIRCLE 363 ON READER SERVICE CARD

Maillist is a mail list program which uses an ISAM-based file system to minimize disk access times. A database consist of a master file and up to four index files. The program is available for TRS-80 Models I, III ($75) and II ($150). Racet Computers, 1330 N. Glassell, Suite M, Orange, CA 92667.
CIRCLE 364 ON READER SERVICE CARD

Deluxe Addresser provides business mailing list capability with a single cassette drive. Available for the PET or TRS-80, the program handles a standard four-line address with phone and up to eight user-defined address flags. $40. Harry H. Briley, P.O. Box 2913, Livermore, CA 94550.
CIRCLE 365 ON READER SERVICE CARD

Compumax announces the Atari 800 version of **Microledger**. Features specific to the Atari version are improved updating options which allow the user to review and update any records in the journal or chart of accounts, a running balance column in the journal listing which shows the user on input whether the journal is balanced, and numerous error traps which alert the user to improper input. $140. Compumax, Inc., P.O. Box 1139, Palo Alto, CA 94301. (415) 321-2881.
CIRCLE 366 ON READER SERVICE CARD

Monument Computer Service announces **Medical Secretary** for the Apple II or Apple II Plus with two or three disk drives and 130-column printer. The system includes elements for appointment scheduling, patient registration, private patient billing, insurance claim preparation and medical record preparation. $500. Monument Computer Service, Village Data Center, P.O. Box 603, Joshua Tree, CA 92284, (800)854-0561; in California, (800)432-7257.
CIRCLE 367 ON READER SERVICE CARD

Account81 is an an accountant write-up package which provides a full inventory of reports and bookkeping records including: chart of accounts, balance sheets, income statements, income journal register, adjustment journal register, general ledger, working trial balance, comparison reports, check register, master payroll report, employee list, 941s, W-2s, and check writer. It is currently available for use with the Alpha Micro AMOS operating system. Pony Express Services, 100 West 57th St., New York, NY 10019. (212)265-7446.
CIRCLE 368 ON READER SERVICE CARD

Beefup is a cow/calf herd-management performance data system written in CBasic for a 48K computer with dual drives and a 132-column printer. The system provides two reports: Cowprint, which shows each significant item of data on every calf of every cow currently in the herd, with calf ratings, and Calfprint, which shows cumulative calf data with ratios by sex and year, plus herd sire summaries and rating. $350. St. Benedict's Farm, Box 366, Waelder, TX 78959. (512) 540-4814.
CIRCLE 369 ON READER SERVICE CARD

A-T Enterprises announces **Property Analysis System**, a comprehensive software program that provides investment analysis and future financial projections for all types of income properties. The PAS software will operate on most popular microcomputers requiring 48K of RAM, one disk drive, a video terminal, and an 80-column printer. $250. A-T Enterprises, 221 No. Lois, La Habra, CA 90631. (213)947-2762.
CIRCLE 370 ON READER SERVICE CARD

YOU THINK YOU'VE SEEN WORD PROCESSING SOFTWARE?

The MAGIC WAND™ Word Processing

System offers you the best features of any system in the micro market

FEATURES INCLUDE:

Full-screen text editor
Simple, control key operation
Edit programs as well as text
Assemble, compile or run programs without modification
Files larger than memory
Files up to 256K
Library files
Merge part or all of one file with another
Spool printing
Print a file while editing another
Easy page formatting
Simple commands set margins, page length, etc.
Override commands at run-time
Give any command from the keyboard as well as in file
Variable pitch control
Change pitch in mid-line, even mid-word
Up to 128 user-defined variables
String, numeric or dollar format
Form letter generation from external data files
Compatible with both sequential and fixed-record files
Conditional commands
Any command may be conditional
Print to disk and/or printer
Save all or part of output on disk
Switch from specialty printer to CP/M list device
Print the same file on either specialty or standard printer

EASE OF OPERATION

With all its power, the MAGIC WAND is remarkably easy to use. This is no accident. The command structure is designed to be flexible and logical so that you can perform basic functions with a minimum of commands.

We have included in the manual a step-by-step instructional program, for the person who has never used a word-processor before. The trainee uses sample files from the system disk and compares his work to simulated screens and printouts.

In addition to the lessons, the manual has a complete documentation of the command structure, special notes for programmers, an introduction to CP/M for non-programmers and a glossary. The manual is typeset, rather than typewritten, for greater legibility.

We have written the manual in non-technical English, because we want you to read it. We don't overload you with a bunch of jargon that could confuse even a PhD in Computer Sciences.

We send out newsletters so that users of the MAGIC WAND can learn special applications of the print commands. For example, we might show you how to create a mailing list or set up an index for a file.

In short, we've done everything we can to make things easy for you. Because the best software in the world is just a bunch of code if you can't use it.

For more information, call or write:

small business applications, inc.

3220 Louisiana • Suite 205 • Houston, Texas 77006 • 713-528-5158

CIRCLE 194 ON READER SERVICE CARD

CP/M is a registered trademark of Digital Research Corp.

Vista

Model V1000

. . . Looking Out For You.

Eight Inch Floppy Disk Drive Subsystem Model V1000

The V1000, Vista's sophisticated new disk drive subsystem, sets new standards for ease of access and use. Its innovative design permits disk drives to be mounted or removed quickly and easily for system reconfiguration or servicing.

Features:

- Deluxe chassis with internal slide allows easy access.
- Storage capacity from 250 kilobytes to 2.5 megabytes.
- Desk or rack mountable.
- Accomodates both single-sided and double-sided drives.
- Industrial quality cabinet with die cast front bezel.
- Drives pull out for easy service and maintenance.

Prices:

Cabinet with (2) single sided drives w/power supply .. $1595.00
Cabinet with (2) double sided drives w/power supply . $2295.00
Cabinet (only) ..... $ 395.00

Model V200

Vista's Line of High Performance, High Reliability Products also Includes these Advanced Components

Daisy Wheel Printer Model V300

Features:

- 96-character proportional, bi-directional printing
- Interface - Parallel or RS232-C option

Prices:

V300-25cps $1895.00
V300-45cps $2195.00

Minifloppy Disk System, Model V200

Features:

- Storage capacity from 200K bytes to 12 megabytes
- Compatible with industry standard S100 mainframes.
- System software - Vista CP/M™ VOS Disk Operating System and Basic - E compiler.

Prices:

Starting as low as $695.00
V200-Exidy version $1199.00

Model V300

Vista Computer Company 1317 E. Edinger Avenue • Santa Ana, CA. 92705 • (714) 953-0523

Dealer Inquiries Call Toll Free (800) 854-8017

CIRCLE 242 ON READER SERVICE CARD

™ is a registered trademark of Digital Research

Creative Computing-- Albert Einstein in black on a red denim-look shirt with red neckband and cuffs.

Creative's own outrageous **Bionic Toad** in dark blue on a light blue shirt for kids and adults.

Plotter display of **PI to 625 Places** in dark brown on a tan shirt.

I'd rather be playing spacewar-- black with white spaceships and lettering.

Give your tie a rest!

All T-shirts are available in adult sizes S,M,L,XL. Bionic Toad, Program Bug and Spacewar also available in children's sizes S(6-8), M(10-12) and L(14-16). Made in USA. $6.00 each plus 75¢ shipping.

Specify design and size and send payment to Creative Computing, 39 E. Hanover Ave., Morris Plains, NJ 07950. Orders for two or more shirts may be charged to Visa, MasterCard or American Express. Save time and call toll-free **800-631-8112** (in NJ 201-540-0445).

Crash Cursor and Sync from the comic strip in SYNC magazine emblazoned in white on this black shirt.

Computer Bum-- black design by cartoonist Monte Wolverton on gray denim-look shirt with black neckband and cuffs.

The **Program Bug** that terrorized Cybernia in **Katie and the Computer** is back on this beige t-shirt with purple design. You can share the little monster with your favorite kid.

Roll down the block with this little black **Robot Rabbit** (on a bright orange t-shirt) on your back and you can intimidate every carrot, radish or cuke in your way.

EDUCATIONAL

Apple II **Continuous Equation Simulator** is for engineering/science students and professionals who desire the power of large differential equation simulations on microcomputer hardware. Simulation problem size can be in excess of 150 integrators on a 48K system with DOS. $149.95. Modulo 2 Company. P.O. Box 3795, University Park, NM 88003. (501) 522-0592.

CIRCLE 371 ON READER SERVICE CARD

Math/Stat Disk System is a mathematics and statistical analysis package designed for students and professionals. Features include: a series of several regression analysis programs with deviation and smoothed data, T-statistics, simultaneous equations, bar graphs, equation plotting, and a data base storage and entry system with full editing capabilities. $59.95. Bluebird's Inc., 2267 23rd St., Wyandotte, MI 48192. (313) 285-4455.

CIRCLE 372 ON READER SERVICE CARD

Assistant Principal is an administrative package for junior and senior high schools which offers control of class rosters, student master records, student schedules, teacher assignments and grade reporting. It requires an Apple II with two disk drives and Applesoft in ROM. The seven disks and two-volume operating manual sell for $500. Monument Computer Service, Village Data Center, P.O. Box 603, Joshua Tree, CA 92284. (800) 854-0561; in California, (800) 432-7257.

CIRCLE 373 ON READER SERVICE CARD

WORD PROCESSING

Wordbank provides a facility for writing letters, reports, manuals and other documents on a one-time or repetitive writing letters, reports, manuals and other numbering and page numbering. Lines may be added, changed or deleted anywhere in the document. The program is written for the 64K TRS-80 Model II with one disk and a line printer. Taranto & Associates, Inc., P.O. Box 6073. 112B Paul Dr., San Rafael, CA 94903. (415)472-2670.

CIRCLE 374 ON READER SERVICE CARD

LJK Enterprise introduces Letter Perfect, a word processing package for the Atari 800 computer and 825 line printer. In addition to standard word processing features, the program supports proportional spacing. $150. LJK Enterprise, Inc., P.O. Box 10827, St. Louis, MO 63129. (314)846-2313.

CIRCLE 375 ON READER SERVICE CARD

MUSIC & GRAPHICS

Audiophile Library System is for the serious music lover with a large collection of records or tapes. It features the following modes: Add a selection to the file, Edit a selection in the file, Find a specific selection or type, List the entire file, or Show the unused tapes. ALS is available for TRS-80 Models I and III with TRSDOS in single or two-disk format. $19.95. GB Associates, P.O. Box 3322, Granada Hills, CA 91344.

CIRCLE 376 ON READER SERVICE CARD

New user-oriented software for the **Cromemco graphics** system is said to decrease programming time and facilitate the development of graphics applications. The system can be used to display color or black-and-white images with up to 756 x 482 point resolution on a high quality RGB monitor. Software and Hardware permit the user to select 16 colors for the color map from a palette of 4096 colors. Available on 5" or 8" disk. $295. Cromemco, Inc., 280 Bernardo Ave., Mountain View, CA 94043. (415) 964-7400.

CIRCLE 377 ON READER SERVICE CARD

AppleGraph is a software package designed for general purpose plotting of data in a variety of formats. It produces high-resolution. multi-color graphics for video display and hardcopy output. $200. Business and Professional Software, Inc., P.O. Box 11 Kendall Square Branch. 238 Main St., Cambridge. MA 02142. (617) 491-3377.

CIRCLE 378 ON READER SERVICE CARD

Curvecopy is a high-speed, machine language program which copies a high-resolution display to the Hiplot DMP-2 plotter. It scan-maps pictures from hi-res screen to the plotter in either of three selectable sizes. $75. West Coast Consultants, 1775 Lincoln Blvd., Tracy, CA 95376. (209) 835-1780.

CIRCLE 379 ON READER SERVICE CARD

Computer Station introduces **Enhanced Paper Tiger Graphics** Software, a driver routine to dump high resolution pages of the Apple II or Apple II Plus to the IDS 440G Paper Tiger printer. The program features turn key operation and the ability to dump a current hi-res page without storing it on disk first. $44.95. Computer Station, 12 Crossroads Plaza, Granite City, IL 62040. (618) 452-1860.

CIRCLE 380 ON READER SERVICE CARD

Super Message allows the Apple II to be used to display colorful messages in shop windows, counter displays, etc. Messages are produced in full-page "chunks," each of which allows mixed typestyles, typesizes and colors in mixed upper and lower case. The program requires 48K with Applesoft in ROM. $50. Connecticut Information Systems Co., 218 Huntington Rd., Bridgeport, CT 06608. (203) 579-0472.

CIRCLE 381 ON READER SERVICE CARD

SAVE MORE THAN 20%!
NORTH STAR INTERTUBE MICROTEK
ZENITH RCA-COSMAC ITHACA
THINKER TOYS GODBOUT SUPERBRAIN
THE SMARTEST COMPUTERS AT THE SMARTEST PRICE

HORIZONE-1-32K-DOUBLE DEN ASSM-A TESTED	$1980
HORIZON-2-32K-DOUBLE DEN ASSM & TESTED	2394
SALE 30% OFF HRZ RAM KITS	
	32K 4/8 00, 16K 314 00

HRZ DRIVES DD	$ 315	MAIL MANAGER	239
INFOMANAGER	360	GENERALEDGER	769
HRZ-64Q, HARDDISK	7190	HRZ-2-32K-Q ASM	2699
NS HARD DISK 10M	3899	NS PASCAL ON DISK	190
NORTH STAR BASIC	FREE	COLOR I	PHONE
ITHACA COMPUTER	2495	ITHACA RAM 64K	845
8088 CPU 16 BIT	695	SSM 280 CPU KIT	221
MEAS 64K RAM ASM.	599	SSM VIDEO BRD VB3	412
GODBOUT SYSTAT	285	SUPERRAM 32K	580
DISCUS/2D CP/M	975	SUPERRAM 16K	290
2D ADD DRIVE	650	2 2 ADD DRIVE	975
TARBELL CONTROLER	295	DISCUS/2 2	1259
INTERTUBE II	725	HARD DISK 26 Mb	3995
SUPERBRAIN	2395	SUPERBRAIN QUAD	2995
ZENITH Z-19 A & T	725	ZENITH H-11	2695
HEATH Z-89 48K	2495	MICROTEK PRINTER	675
ANADEX 9502-1	1349	ANADEX 9000	895
NEC PRINTER	2599	SECRETARY WORD PRO	99
TEXTWRITER III	112	GOFAST SPEEDBASIC	71
EZ-80 Z-80 TUTOR	25	NS BASIC COMPILER	77
ECOSOFT ACCOUNTING	315	EZ-CODE IN ENGLISH	71
BOX OF DISKETTES	19	WORDSTAR	325
		BASIC DEBUGGER	99

Which Computers are BEST? BROCHURE..... FREE
ORDER 2 or more COMPUTER..... BIGGER DISCOUNTS
WE WILL BEAT OUR COMPETITION'S PRICE
FACTORY ASSEMBLED & FACTORY WARRANTY
AMERICAN SQUARE COMPUTERS
KIVETT DR.* JAMESTOWN, NC 27282 * 919-886-4577
CPM IS A REGISTERED TRADEMARK OF DIGITAL RESEARCH.

CIRCLE 105 ON READER SERVICE CARD

COMPUTER PROGRAMS
for
COMMODORE PET

M.A.L.A.©
(Microcomputer Assisted Learning Aids)

Subscription Programs for Elementary Levels
32 programs—4 per month only $40

We also carry Commodore Computer Products at discount prices

PET educational software catalog—300 programs send $2.50 to

COMM*DATA SYSTEMS
P.O. Box 325
MILFORD MI. 48042
(313) 685-0113

CIRCLE 126 ON READER SERVICE CARD

WHY SPEND $150 OR MORE FOR AN INFORMATION RETRIEVAL PROGRAM?

Island Cybernetics has a program which may do your job for just $37.50. Over 300 users are putting this program to work, with data bases for scientific bibliographies, magazine article abstracts, aside collections, recipes, correspondence, and dozens of other applications.

Our system is optimized for retrieval of free-format text based on combinations of keywords. Read the review in the Nov/Dec '80 issue of S-100 Microsystems, p 14-16, or request our free application notes.

Hardware Requirements: runs on 8080 or Z-80 microcomputers using a CP/M* compatible operating system and having at least 32K of memory with two disk drives. Comes ready to run with users manual and demonstration data base on 8" single density and many 5" format disks.

-$37.50, postage paid-

ISLAND CYBERNETICS
P.O. Box 208, Port Aransas, TX, 78373 (512) 749-5843

*CP/M is a registered trademark of Digital Research

CIRCLE 220 ON READER SERVICE CARD

We're the MAGNOLIA people you've been looking for...

Add the CP/M® disk operating system to your Zenith/Heath 89 All-in-One Computer. Easily installed hardware and software proven by reliable service for more than a year. Supports 8-inch, double-sided 5-inch, and hard disk drives.

Only $195.

Ask your local dealer, or

MAGNOLIA MICROSYSTEMS
2812 THORNDYKE AVE. WEST
SEATTLE, WASHINGTON 98199

(206) 285-7266

CP/M® is a registered trademark of Digital Research Inc

CIRCLE 182 ON READER SERVICE CARD

MAGIC WAND®
AS DATA BASE MANAGER

Application Notes for easy screen oriented interactive info entry, data validation and update routines, selection and report writing, forgiveness in entry, file revision, screen & report format all defaults from disk file. Multiple files relate and display data from one screen. Up to 32 fields per file, no delete entry, no file size limits, up to 128 user-defined lines per records, header and footer, up to 80 characters per line, labels and reports. Application notes will help get your tough applications going quickly and easily by showing you the full application power of this fantastic, sensitive software. **$35,** with purchase of Magic Wand! **only $15.**

MAGIC WAND® III THE BEST word processing package there's nothing as powerful, useful, or as easy to use. Requires 32K CP/M®, MP/M®, CDOS® or TurboDOS® and 2 disk drives with 8" single-density, 8" soft-sectored or 5" Northstar, Vector Graphics Micropolis®, SuperBrain® disks. **Applies** Diablo, Qume or Microsoft 2500 spacing Daisywheel or Videoterminal board, 132 or 16 cpl's. **THIS IS** Word By Word® with CP/M version, **delivered ready to run** — version configured to your CRT, printer, printer and disk. Includes extensive 200+ page, fully illustrated Users Manual and Reference and **$299.**

10,000 WORDS PROOFREAD IN 1 MINUTE
SPELLGUARD® THE BEST, most useful spelling package available. Requires 32K CP/M®, MP/M® or CDOS® and 2 disk drives with 8" single-density, 8" soft-sectored or 5" Northstar, Micropolis, SuperBrain disk. **$249.**

Spellguard® and Magic Wand®, only $510.

We rigorously select, use and support the software we sell. Call us personally with questions. We're small enough to be personal, but established enough to offer you a full line of software with substantial volume discounts. Outstanding quality customer service. Expert orders welcome. ® trademark®

PELICAN PROGRAMS
49 Pelican Court, Syosset, NY 11791
(516) 921-3520

CIRCLE 217 ON READER SERVICE CARD

☆ SOFTWARE FOR OSI ☆

VIDEO GAMES 1 $10
Three Games. Head On is like the popular arcade game Tank Battle is a tank game for two to four. Trap! is an enhanced blockade style game

VIDEO GAMES 2 $10
Three games. Gremlin Hunt is an arcade-style game for one to three players. Bomb It (duel of mobile artillery for two to four players) and Android Nim (for one or two)

ADVENTURE MAROONED IN SPACE $12
An adventure that's one of a kind. Save your ship and yourself from destruction!

DUNGEON CHASE $10
A real time video game where you explore a twenty level dungeon

BOARD GAMES 1 $15
Two games. Mini-gomoku is a machine language version of five stones gomoku. Cubic is a 3-D tic tac toe game. Both with graphics

DISASSEMBLER $12
Use Spellbook at the ROMs in your machine to see what makes BASIC tick. Recommended! The assembler source code of machine language programs to understand how they work. The disassembler contains subroutines which identify the call addresses being used. Any other program has this!

SUPER! BIORHYTHMS $15
A sophisticated biorhythm program with many unique features

C1 SHORTHAND $12
Use only two keys to enter any one of the BASIC commands or keywords. Saves much typing when entering programs. Written in machine language

Send for FREE catalog

For all BASIC in ROM systems. Selected programs available on disk, tape and sound on video games

ORION SOFTWARE ASSOCIATES
147 Main St. Ossining, NY 10562

CIRCLE 188 ON READER SERVICE CARD

Problem

The world is full of intriguing problems that never got into a textbook.

Problems for Computer Solution
by Steve Rogowski

Ninety intriguing and fascinating problems, each thoroughly discussed and referenced, make an excellent source of exercises in research and preliminary investigation. Eleven types of problems are provided in the following areas: arithmetic, algebra, geometry, trigonometry, number theory, probability, statistics, calculus and science. Author Stephen Rogowski of SUNY-Albany has included several problems which have never been solved. He feels that some research and an attempt to solve these will sharpen students' insight and awareness.

Some of the problems are not new like the one asking how much the $24 the Indians were paid for Manhattan would be worth today had it been deposited in a bank. However, this problem was revised to have a variable interest rate so it would be a challenge to program. Of course, many of the problems are new and have never been in print before.

The student edition has 106 pages and includes all 90 problems (with variations), 7 appendices and a complete bibliography. Cost is $4.95.

The 182-page teacher edition contains solutions to the problems, each with a complete listing in Basic, sample runs, and in-depth analyses explaining the algorithms and theory involved. Cost is $9.95.

To get one or both books send payment plus $2.00 shipping and handling per order to *Creative Computing*. Credit card orders may be called in toll-free to the number below.

Order yours today. If you are not completely satisfied, return it for a full refund plus your return postage.

creative computing

Morris Plains, NJ 07950
Toll-free **800-631-8112**
(In NJ 201-540-0445)

GAMES & RECREATIONAL

Lakefront Software announces **Conquest** for the 16K TRS-80 Level II, a two-player game set in outer space. Players fight fan control of a newly-discovered planet by deploying armies, fighting off invasions and planning attacks. $14.95. Lakefront Software, P.O. Box 5240, Willowick, OH 44094.

CIRCLE 382 ON READER SERVICE CARD

In **Ants**, hundreds of animated ants battle for survival at different speeds in one of three game variations. It may be played by two people or one person against the TRS-80 16K Level II. $14.95. Also available is **High Speed Life** which features 32 preprogrammed patterns, including gliders, pulsars, oscillators, spaceships, and collisions. $14.95. Synergistic Solar, Inc., P.O. Box 560595, Miami, FL 33156.

CIRCLE 383 ON READER SERVICE CARD

RobotWar from Muse features a battle among two to five warring robots. While the robots are on the battlefield, no person has direct control over their battle tatics; each one must have had its microcomputer "brain" programmed by a human mentor before it can take to the battlefield. Muse, 330 N. Charles St., Baltimore, MD 21201. (301) 659-7212.

CIRCLE 384 ON READER SERVICE CARD

UTILITIES & MISCELLANEOUS

The Locker is a software extension for the TRS-80 Model II which enhances the standard TRSDOS 2.0 and Basic by prohibiting the use of List and LList commands to protect against unauthorized program modification. $29.95. The management, P.O. Box "T," Aledo, TX 76008.

CIRCLE 385 ON READER SERVICE CARD

Reader is a utility package that interfaces the TRS-80 Models I, II, and III to the Scan-tron Model 2012 Optical Mark Forms Reader, enabling the user to input data directly into the computer using pencil-marked forms. $175. Desert Sound, Inc., 16268 Main St., Hesperia, CA 92345. (714)244-2555.

CIRCLE 386 ON READER SERVICE CARD

Racet Computes announces **Discat**, a diskette cataloging/indexing utility which allows the user to keep track of programs in a categorized library. A 48K system can provide indexes of nine categories, each containing 1900 entries. The program is available for TRS-80 Models I and II, and operates with TRSDOS, NEWDOS+, and NEWDOS80. $50. Racet Computes, 1330 N. Glassell, Orange, CA 92667.

CIRCLE 387 ON READER SERVICE CARD

Trakcess is a utility for 48K TRS-80 disk systems. It allows the reading and writing of entire tracks, enabling the user to create non-standard formats or read in and duplicate others. $24.95. The Alternate Source, 1806 Ada St., Lansing, MI 48910. (517) 485-0344.

CIRCLE 388 ON READER SERVICE CARD

Utility Package for the TRS-80 Model II provides the user with eight additional DOS commands. Written in machine language, the package includes such capabilities as: recovery of blown diskettes, copy multiple files, examine/change diskette contents, catalog diskette directories and change disk names and create files. $150. Racet Computes, 702 Palmdale, Orange, CA 92665. (714) 637-5016.

CIRCLE 389 ON READER SERVICE CARD

The Alternate Source announces a five program **utillty package** for TRS-80. Programs include: BTrace, Compress Program Utility, Search, Changes and Replace. Prices range from $14.95 for a single program on cassette to $49.95 for all five programs on disk. The Alternate Source, 1806 Ada St., Lansing, MI 48910. (517) 485-0344.

CIRCLE 390 ON READER SERVICE CARD

Masterdisk allows Apple users to examine and edit any standard DOS disk. A disk sector may be read into a holding area and then displayed in several formats, including, VTOC, directory, Applesoft program, Integer Basic program, binary file and text file. $29.95. Masterworks Software Inc., 15 Dapplegray Lane, Rolling Hills Estates, CA 90274. (213) 530-3036.

CIRCLE 391 ON READER SERVICE CARD

Using **Appointments** enables the user to manage an appointment book using the Apple II with 48K RAM, Applesoft firmware card and one disk drive. Appointments may be viewed directly on the monitor screen or listed on a printer. $60. Andent, 1000 North Ave., Waukegan, IL 60085. (312) 244-0292.

CIRCLE 392 ON READER SERVICE CARD

Brownpak I for Apple II computers with Applesoft in ROM is a utility package. It includes a machine language program called The Programmer's Power Tools, which includes Print Using capabilities, packing and unpacking of data, machine language sorting and an input routine for disk usage. Also included in the package are several Applesoft programs which can be used as subroutines in the user's own program: Automatic Diskette Menu, Disk Free Utility, Hi-Res Shape Utility programs, and User-Defined Functions from Basic. $39.95. The Computer Emporium, 3711 Douglas, Des Moines, IA 50310.

CIRCLE 393 ON READER SERVICE CARD

NewBasic adds new commands and utilities to TRS-80 Model I Level II or Disk Basic. Among the enhancements are a spooler, despooller and a new directory command which may be issued while in Basic, blinking block cursor, auto key repeat, graphics commands and the ability to input form or output to the RS-232C interface. Disk. $29.95; cassette. $19.95. Modular Software Associates. 3533 Prospect Ave., Glendale, CA 91214.

CIRCLE 394 ON READER SERVICE CARD

SYSTEMS SOFTWARE

SYSTEMS

Providing singe- or multi-user capabilities with enhanced file management and software development facilities, the **Oasis** operating system is now available for the S-100 based North Star Horizon. Retail price is $500 for the single-user and $850 for the multi-user version. Phase one Systems, 7700 Edgewater Cr., Suite 830, Oakland, CA 94621. (415) 562-8085.

CIRCLE 395 ON READER SERVICE CARD

Digital Research announces **TEX Version 2.0**, said to be a faster, more powerful edition of the TEX Text Formating Program. It is compatible with all versions of CP/M and requires a text editing program to produce the TEX input file. Digital Research, P.O. Box 579, 801 Lighthouse Ave., Pacific Grove, CA 93950. (408)639-3896.

CIRCLE 396 ON READER SERVICE CARD

HESBAL is a 6502 assembler for the PET/CBM. It leaves over 1200 bytes accessible to the user and requires one tape or disk drive. Features include label size of six characters or more, several pseudo-opcodes and over 25 error messages. HESEDIT is a full screen editor which can be used to prepare HESBAL source or can be used by itself for maintaining data files. Price for both programs is $23.95 on tape or $26.95 on disk. Human Engineered Software, 3748 Inglewood Blvd., Room 11, Los Angeles, CA 90066. (213) 398-7259.

CIRCLE 397 ON READER SERVICE CARD

Bridge is a file conversion tool designed to move Apple Pascal files into DOS 3.3 format and DOS files into Pascal readable form. Using this program, the user can edit Basic programs under the UCSD/Apple full screen editor, read DOS 3.3 files with a Pascal program, and access DOS binary files from Pascal in their original, byte-for-byte format. $90. Analytic Solutions Incorporated, P.O. Box 13091, Research Triangle Park, NC 27709.

CIRCLE 398 ON READER SERVICE CARD

APEX provides Apple users with a complete program development and file management system. The basic package includes a high speed, two-pass resident assembler and macro editor. The assembler generates an alphabetized symbol table and a crossreference table, and is capable of assembling over 1900 lines per minute. The editor has 18 commands and 10 text buffers. $99. Apparat, Inc., 4401 S. Tamarac Pkwy., Denver, CO 80237. (303) 741-1778.

CIRCLE 399 ON READER SERVICE CARD

POLY PAKS

FREE!
1981 DISCOUNT ELECTRONICS CATALOG

JOIN THE PAK!

Send for our Free catelog and become a member of our exclusive Pak. Our members receive Poly Paks' exciting catalog several times a year. We offer: Penny Sales, Free Premiums and Low, Low Prices on a wide variety of Electronic Products such as Computer Peripherals, Integrated Circuits, Speakers, Audio Equipment, Rechargeable Batteries, Solar Products, Semiconductors, and much, much more! Take advantage of our 25 years as America's foremost Supplier of discount electronics.

Over A 5 Million Satisfied Customers

RUSH ME YOUR FREE DISCOUNT CATALOG!

NAME: _____

ADDRESS: _____

CITY: _____

STATE: _____ ZIP: _____

CLIP AND MAIL COUPON TODAY TO:
POLY PAKS, INC.
P.O. BOX 942, CCS
S. LYNNFIELD, MA. 01940 (617) 245-3828

CIRCLE 222 ON READER SERVICE CARD

Super Paddle

Are the paddle controllers on your Apple wearing out? Or did you get a new Apple without paddles?

We've got good news for you! Super Paddles. Each paddle control consists of a high-precision linear potentiometer and a big (1/2" D) industrial-quality pushbutton mounted in a sturdy 4" x 2" x 1" metal case which matches the Apple. Each of the two paddles is connected with a long 5-foot cable to the Apple paddle socket.

Every component in a set of Super Paddles is the very finest quality available. The set is backed by a 90-day limited warranty from the manufacturer as well as Peripherals Plus' moneyback guarantee of satisfaction.

To order, send $39.95 plus $2.00 postage and handling (NJ residents add $2.00 sales tax) to the address below. Credit card customers may call orders to our toll-free number.

Peripherals Plus

39 East Hanover Ave
Morris Plains, NJ 07950
Toll-free 800-631-8112
(In NJ 201-540-0445)

CIRCLE 239 ON READER SERVICE CARD

Worth A Fortune

Past issues of Creative Computing. What are they worth today? It varies. To a collector, Vol. 1, No. 1 is worth $7 or $8. To a scrap dealer, less than two cents.

But we're not selling old back issues. We're all out.

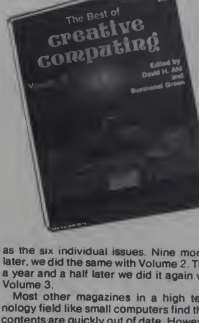
On the other hand, you know that much of the content of Creative Computing is timeless. The Depth Charge program in Vol. 1, No. 1 is just as challenging today as the day it was written. Walter Koetke's series of five articles on using computers in the classrom are as valid today as the day they first speared in print. And scores of people have written about obtaining reprints of Don Piele's classic problem-solving series.

Our Mistake

In our early growth years when we had 5,000 and then 10,000 subscribers we couldn't imagine we would ever need more than 1000 extra copies for back issue sales. That's about what we printed extra. However, by the time we were going into Volume 3, we found our stocks of Volume 1 issues virtually depleted.

Our Solution

So we selected the best material from Volume 1, edited it, put it together in book form and sold it for $8.95, about the same



as the six individual issues. Nine months later, we did the same with Volume 2. Then a year and a half later we did it again with Volume 3.

Most other magazines in a high technology field like small computers find their contents are quickly out of date. However, because we've concentrated on applications and software, our content retains its value for a much longer time. Our subscribers know this and retain their copies of Creative Computing long after they've disposed of the more hardware-oriented magazines.

Now you can obtain the best material from the first three years of Creative Computing in book form and the next three years (minus four issues) in the original magazine form.

Our Offer

We have a unique special offer, so pay close attention to this paragraph. (Computer types ought to be able to understand this). If you order any one item below, you pay the full price. If you order any two items, take a 5% discount from the total; any three, take a 10% discount; any four, take a 15% discount; any five, take a 20% discount, and on all six take a whopping 25% discount from the total price.

Best of Creative Computing-Vol 1	$8.95
Best of Creative Computing-Vol 2	8.95
Best of Creative Computing-Vol 3	8.95
Volume 4 (Four issues)	6.00
Volume 5 (Ten issues)	15.00
Volume 6 (Twelve issues)	18.00

Less discount (5% for two items, 10% for three, 15% for four, 20% for five, 25% for all six) Shipping ($2.00 USA, $5.00 foreign)

We guarantee you'll never find a better value in computer applications reading matter. On average you're getting 128 pages of solid information for each $1.00. If you're not completely satisfied after you've read them, send the books or magazines back to us and we'll refund your full purchase price plus the return postage.

creative computing

Morris Plains, NJ 07950
Toll-free **800-631-8112**
(In NJ 201-540-0445)

ARTICLES AND COMMENTARY

- **Editorials**
  Birth of a Magazine — Ahl
  A Computer in the Classroom? Is Breaking Into A Timesharing System A Crime? — Tagg
  Where Are We Going? — Ahl
- **Computers in Education**
  What's Wrong With the Little Red Schoolhouse? — Ahl
  How to Cope With Your Computer
  Recent Trends in Mathem...
  Curriculum Rev...
  CITALA: ...
  How...
  EXPER SIR
  Monty Pyt...
  If IP Cooler
- **Transports:**
  The Perable
  Technical Tr...
  CONDUIT: Do...
  Statewide Po...
  Expected Be...
- **Hard Core C.A...**
  PLATO IV Syst...
  TICCIT System
  PLANIT: The Po...
- **Careers**
  A Computer Car...
  Career Educetior...
  Key to Your Futu...
  Profile of an Indu...
- **Applications**
  Computers and the Computer Simulate...
  Weather Forecastin... ...mmulations
  Relativity for Computers: Mr. Spock's 7th Sense — Kuber
- **Programming and Languages**
  Structured Programming — Hoogendyk
  On Computer Languages — Ahl
  Toward A Human Computer Language — Cannare
  Learning About Smalltalk — Goldeen
  Eclectic Programming Languages — A New Approach to Testing
- **Computer Impact on Society**
  The Computer Threat to Society — Ahl
  Digital Calculators — Then and Now
  The Computer Threat to Society?
  Putting Teeth Into Privacy Legislation — Hastings
  Inst... ...leaders as Prey — Hastings
  ...ng in the Space Age — ...ner Looks a Dea... Fritze
  ...ic Attitudes Toward ... — Ahl
  ...onference
  ...acy Should You Have — Ex-Social Security ... — Campbell
  ...mputers — Malcolm ...agement Information
  ...riminal Justice ...elman
  ...to the Computer
  ...tat Computer
  ...os Snyder

AND THINGS

...puterfest Exchange — ...oushnell — Todd
Playing PONG to Win — Ahl
Your Own Computer? — Ahl
Introducing Computer Recreations Corp — Todd, Guthrey
Creative Computing Compendium
Flying Buffalo — Loomis
Complete Computer Catalogue
National Computers in Education Conference?

ARTICLES AND COMMENTARY

- **Technology — Present and Future**
  The Future of Computer Technology
  Computing Power to the People
  Videodiscs — The Ultimate Computer Input Device? — Bork
  Round and Round They Go
  The $2.98 Computer Library
  Personal Computers
  Russian Computing — Ahl
  Desk Calculator from Chi...
  Microprocessors & Micro...
  The State of the Art: C...
- **Languages and Program...**
  The Reactive Engine Pa...
  About Computing: Chi...
  David vs. 12 Goliaths
  Sixth Chess Champior...
  Beating the Game: Ti...
  Simulated Strategies: ...Reshman
  Beyond BASIC — Sei...
  The Computer Gies... Teaching with AP...
  Creative Chess — Ko...
  SNOBOL: Tourett...
  A Smalltalk Airplar...
- **Artificial and Exte...**
  Non-Human Intell...
  An Esoteric Ethic...
  The Thinking Co...
  Primer on Artific...
  Can Computers ...
  An Ear on the Ur...
  Communicator: ...
  The Cosmic Su...
- **Literacy, Philosophy, Opinion**
  What is Computer Literacy — Moursund
  Computer Literacy Quiz — Moursund
  A Fable — Speno
  Let Us First Make It — Taylor
  Some Thoughts — Lees
  Information Anyone? — Griffith
  The Government Dinosaur — Winn
  The Magic of EFTS — Ahl
- **Computers in Education**
  Instructional Computing in Schools — Ahl
  Should the Computer Teach the ... Student or Vice-versa? — Luehmann
  The Art of Education: Blueprint for a ... Renaissance — Dwyer
  Computing at the University of Texas
  Computers in Secondary Schools — 1975 Computer Fair — Thomes
  The Madness known as ...
- **Every Person Our Computer**
  Amateur Computing — Libes
  ...More? You Gotta Be ...berts
  ...Computer on ...
  ...ahl
  ...ahl
  ...ner
  ...nbol — Mueller
  ...metry — Chisman
  ...AcCauley
  ...y

...IS, AND PROGRAMS

...ns
...izzes — Ahl
...Recreations
...nto A Lesson — Homer
...r
...me — Yarbrough
...ur Games — Rogers

...Geometry

The Mys... in Dickens
Magic Squares on the Computer — Piele
Non-Usual Mathematics — Reagan
The World of Series — Reagan
Change For A Dollar — Hess
Sequences — Jessen
Progress... — Problems — Reeves

Now there's a magazine to help you get the most out of it.

Get in sync

SYNC magazine is different from other personal computing magazines. Not just different because it is about a unique computer, the Sinclair ZX80 (and kit version, the MicroAce). But different because of the creative and innovative philosophy of the editors.

A Fascinating Computer

The ZX80 doesn't have memory mapped video. Thus the screen goes blank when a key is pressed. To some reviewers this is a disadvantage. To our editors this is a challenge. One suggested that games could be written to take advantage of the screen blanking. For example, how about a game where characters and graphic symbols move around the screen while it is blanked? The object would be to crack the secret code governing the movements. Voila! A new game like Mastermind or Black Box uniquely for the ZX80.

We made some interesting discoveries soon after setting up the machine. For instance, the CHR$ function is not limited to a value between 0 and 255, but cycles repeatedly through the code. CHR$ (9) and CHR$ (265) will produce identical values. In other words, CHR$ operates in a MOD 256 fashion. We found that the "=" sign can be used several times on a single line, allowing the logical evaluation of variables. In the Sinclair, LET X=Y=Z=W is a valid expression.

Or consider the TL$ function which strips a string of its initial character. At first, we wondered what practical value it had. Then someone suggested it would be perfect for removing the dollar sign from numerical inputs.

Breakthroughs? Hardly. But indicative of the hints and kinds you'll find in every issue of **SYNC**. We intend to take the Sinclair to its limits and then push beyond, finding new tricks and tips, new applications, new ways to do what couldn't be done before. **SYNC** functions on many levels, with tutorials for the beginner and concepts that will keep the pros coming back for more. We'll show you how to duplicate commands available in other Basics. And, perhaps, how to do things that can't be done on other machines.

Many computer applications require that data be sorted. But did you realize there are over ten fundamentally different sorting algorithms? Many people settle for a simple bubble sort perhaps because it's described in so many programming manuals or because they've seen it in another program. However, sort routines such as heapsort or Shell-Metzner are over 100 times as fast as a bubble sort and may actually use less memory. Sure, 1K of memory isn't a lot to work with, but it can be stretched much further by using innovative, clever coding. You'll find this type of help in **SYNC**.

Lots of Games and Applications

Applications and software are the meat of **SYNC**. We recognize that along with useful, pragmatic applications, like financial analysis and graphing, you'll want games that are fun and challenging. In the charter issue of **SYNC** you'll find several games. Acey Ducey is a card game in which the dealer (the computer) deals two cards face up. You then have an option to bet depending upon whether you feel the next card dealt will have a value between the first two.

In Hurkle, another game in the charter issue, you have to find a happy little Hurkle who is hiding on a 10 X 10 grid. In response to your guesses, the Hurkle sends our a clue telling you in which direction to look next.

One of the most ancient forms of arithmetical puzzle is called a "boomerang." The oldest recorded example is that set down by Nicomachus in his *Arithmetica* around 100 A.D. You'll find a computer version of this puzzle in **SYNC**.

Hard-Hitting, Objective Evaluations

By selecting the ZX80 or MicroAce as your personal computer you've shown that you are an astute buyer looking for good performance, an innovative design and economical price. However, selecting software will not be easy. That's where **SYNC** comes in. **SYNC** evaluates software packages and other peripherals descriptions. We put each package through its paces and give you an in-depth, objective report of its strengths and weaknesses.

SYNC is a Creative Computing publication. **Creative Computing** is the number 1 magazine of software and applications with nearly 100,000 circulation. The two most popular computer games books in the world, *Basic Computer Games* and *More Basic Computer Games* (combined sales over 500,000) are published by Creative Computing. Creative Computing Software manufactures over 150 software packages for six different personal computers.

Creative Computing, founded in 1974 by David Ahl, is a well-established firm committed to the future of personal computing. We expect the Sinclair ZX80 to be a highly successful computer and correspondingly, **SYNC** to be a respected and successful magazine.

Order SYNC Today

To order your subscription to SYNC, in the USA send $10 for one year (6 issues), $18 for two years (12 issues) or $24 for three years (18 issues). Send order and payment to the address below or call MasterCard, Visa or American Express orders to our toll-free number.

Subscriptions in the UK are mailed by air and cost £ 10 for one year, £ 18 for two years or £ 25 for three years. Send order and payment to the UK address below.

Canadian and other foreign surface subscriptions cost $15 per year or $27 for two years and should be sent to the USA address.

We guarantee your satisfaction or we will refund your entire subscription price.

Needless to say, we can't fill up all the pages without your help. So send in your programs, articles, hints and tips. Remember, illustrations and screen photos make a piece much more interesting. Send in your reviews of peripherals and software too—but be warned: reviews must be in-depth and objective. We want you to respect what you read on the pages of **SYNC** so be honest and forthright in the material you send us. Of course we pay for contributions—just don't expect to retire on it.

The exploration has begun. Join us

The magazine for Sinclair ZX80 users

sync

39 East Hanover Avenue
Morris Plains, NJ 07950, USA
Toll free 800-631-8112
(In NJ 201-540-0445)

27 Andrew Close, Stoke Golding
Nuneaton CV13 6EL, England

CIRCLE 215 ON READER SERVICE CARD

puzzles & problems

The Rearranging Bee

Here's Willard Wordsworth with our kickoff puzzle. "Alright, students, pay attention. Below is a list of names of several countries and one U.S. state. Unfortunately, I seem to have scrambled the letters that make up each name. It is up to you to rearrange them correctly. Nine right out of ten will get you a passing grade on this test. (From *Merlin's Puzzler 3.*)

A. NODPAI	F. LHATDAIN
B. DSNCAOLT	G. INDIRTDA
C. KLASAA	H. ACGIUNAAR
D. RILBAUGA	I. RUSLAITAA
E. EI ANP	J. RISACFOAUHT

The Blockhead Puzzle

Our next puzzle is from Mr. Calvin A. Gundlach of Dunedin, Florida. Mr. Gundlach writes: "Here is a little problem that is sure to confound even the best draftsmen and may confuse even the great Merlin. Pictured below is the top and also the front view of a solid piece of wood. I've drawn only one view because all dimensions of both the top and front are identical."

"The problem is to draw the side view using only solid lines. In other words, there are no dotted lines indicating holes."

Thank you Mr. Gundlach. This is an old, but very good puzzle. You have earned a copy of *Merlin's Puzzler 2* for this fine contribution.

The 26 Cross

The following magic square puzzle is from Susan de Guardiola, of Dallas, Texas. The problem here is to fill in the cross pictured below so that the numbers total 26 in 7 different ways. (2 horizontal rows, 2 vertical rows, the group marked *aaaa*, the group marked *bbbb*, and the group marked *cccc*.) The catch is that you may only use *2 different* numbers, both less than 10, when you fill in the square. Susan gives us 3 solutions to the problem. Merlin gives Susan a copy of *Merlin's Puzzler 1*, an eminently fair trade.

	b	b	
a	c	c	a
a	c	c	a
	b	b	

Mark Kantrowitz of Brookline, Mass., is one of our more consistent contributors. To date he has received *Merlin's Puzzler 1 and 2*. Today he has earned a copy of *Merlin's Puzzler 3* for the following 2 puzzles.

The New Door Puzzle

This puzzle looks easy, but, is it? You are asked to rearrange the letters in the two words NEW DOOR to make one word.

Lead To Gold

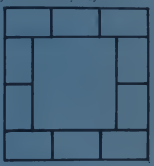
Mark's second puzzle challenges you to change the word LEAD into the word GOLD in 4 moves. (During each step the puzzler must change one letter in the previous word so that a new word is formed).

L	E	A	D
G	O	L	D

Alice in Puzzleland

In *Merlin's Puzzler 1* we chronicled "Alice's Adventures In Puzzleland." One of the puzzles went like this:

"Continuing on her way Alice soon found herself, not at the tea party, but in the Queen's garden. "Please Mr. Five, can you tell me how to get to the Mad Hatter's house? I'm ever so late for the party." "Don't tell her, Five," said the Seven, "unless she tells us how to make a card square." "That's right Alice, you solved everybody else's problem, now you must solve ours." "All right, but please hurry," cried Alice. "You must take ten cards, ace through ten, counting the ace as one, and arrange them in a square in such a way that the points along each side of the square will add up to 18. Each corner card will be counted in two rows." "That's easy," said Alice, quickly arranging the cards. "Now which way do I go?"



The Ten Minute Puzzle

Merlin just shot through the door and dropped the following puzzle on my desk from Mr. B. R. Barnes of Bonnyville, Canada. "This is a fine Puzzle," he boomed, "and I bet none of our readers can solve it in less than 10 minutes." Let's see if you can prove Merlin wrong!

Joe: "I have 3 children and the product of their ages is 36. (That is: $a \times b \times c = 36$)"

Bill: "That's not enough information."

Joe: "Well, the sum of their ages is the same as the number on the house across the street."

Bill: (looking at the number on the house): "That's still not enough information."

Joe: "Oh — you're right. O.K. My eldest child is a redhead."

Bill: "*Now*, I have enough information!"

Our thanks and a copy of *Merlin's Puzzler 3* go out to Mr. Barnes.

A Simple Addition

Here's a quickie from James Leidman of Los Altos, California. Mr. Leidman writes:

"I am a dedicated reader of your magazine, (which seems funny since I'm only 10) and I've devised a puzzle for Puzzles and Problems. The puzzle is a letter addition. (Substitute any numbers 0 through 9 for the letters in the addition problem shown here so that the equation is true. The same number must be used for each occurrence of the letter it is substituted for.)"

Thank you Mr. Leidman. Your puzzle deserves a copy of *Merlin's Puzzler 1*.

```
 ONE
+FOUR
 FIVE
```

A Fine Old Saying

Our last puzzle is a "Find The Proverb" problem. Hidden in the jumble of letters inside the square at the right is a well known saying (?). To find it start with any letter, and, reading every other letter you will find half of the proverb. Then starting at some other letter do the same and you will find the other half.

Answers on page 226.

E	I	D	L	P	S	O	
O						T	
						N	
H						A	
B						E	
C	R	T	E	A	V	W	

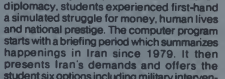
That ends another session with Merlin. If you have a puzzle that you would like to share send it in, and, if Merlin uses it he will send you one of his famous books. You can also buy these books from Creative Computing. Just drop them a line and they will be glad to send you particulars.

Your editor,

Charles Barry Townsend

Students Use Computers and Iran in Diplomacy Lesson

This winter, a group of students at Carleton College in Northfield, MN have "negotiated with Iran" by computer. In a course on diplomacy, students experienced first-hand a simulated struggle for money, human lives and national prestige. The computer program starts with a briefing period which summarizes happenings in Iran since 1979. It then presents Iran's demands and offers the student six options including military intervention.

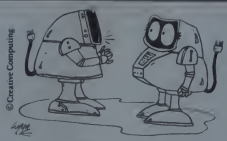


The professor's objective was to present the necessity of maintaining a broad view in diplomatic negotiations. "The exercise required students to keep a number of different values on their minds at the same time," he says. "This model had 10 values, but some negotiations involve 100." Junior Jeff Nixa, who scored 99 out of 100 possible points in the negotiations commented, "I learned negotiations aren't just two guys sitting down and agreeing on something."

Computers Speed Up Jury System in Las Vegas

Clark County, the Nevada government district which includes Las Vegas, has developed a computerized system that eliminates the need for people serving jury duty to report unless they are specifically assigned to a potential trial. Citizens of Clark County who are selected for jury duty receive the usual notice in the mail, however, they are also given the phone number of a computer. When jurors call, the computer greets them and asks them to enter their juror number on the push button keys of the telephone. The computer then tells them if and when they should show up.

"The new system is designed to ease the burden of jury duty on our citizens," says Loretta Bowman, Clark Country Clerk. "Most people don't mind serving as a juror. But they do mind all the waiting around. Our new system eliminates the waiting. It also eliminates the need for added staffs of operators to answer the phone. The system was designed for Clark County by Periphonics Corporation, a New York affiliate of Exxon.



"My, what big LEDs you have."

Mathematical Mechano-hand

Professor David Thompson of the mechanical engineering department of Louisiana State University is using an IBM computer to create the first complete mathematical model of the human hand. He hopes the model will help surgeons improve ways of correcting deformities in the hand caused by accidents or diseases such as arthritis.

By using such a model, a surgeon would be able to gather information about a patient's hand, enter it into a computer, and see an image of how the hand would look years later with our intervention. The surgeon will then be able to simulate corrective procedures using a computer graphics display terminal, adjusting them as necessary and seeing how the hand responds.

A team of engineers, physicians and physical therapists takes measurements of cadavers and studies the interplay between various elements of the musculoskeletal system. The researchers then form mathematical equations from their measurements and match them to other data using the IBM 3033 processor.

Encyclopedia Emancipation

Arete Publishing Company and other reference companies are exploring ways to free encyclopedias from book form by flashing text entries onto home television screens and, where appropriate, adding descriptive sounds—volcanic eruptions, Beethoven symphonies, and even famous speeches.

In August of 1980, Arete introduced its 21-volume Academic American Encyclopedia. The company had by that time also put the entire 10 million word contents of the encyclopedia onto computer tape. Frank Greenagel, president of Arete, said, "We went into this encyclopedia knowing full well that the book form might not be the primary form of the encyclopedia before the decade is out."

Despite Arete's success, many doubt the possibility of the computer encyclopedia replacing the book form. Charles Van Doren, vice president of the Encyclopedia Britannica, though impressed by Arete's achievement, calls the video encyclopedia "annoyingly" slow to use because only one-tenth of a printed page appears on the TV screen at one time. Grolier Inc. points out that, unlike Arete, the type for its Encyclopedia Americana is not set electronically, and would be much more difficult and expensive to put on computer tape.

Many other companies, though, are very interested in computerizing texts, and want to go beyond encyclopedias. The Source Telecomputing Corporation of McLean, VA, for example, wants to put the Bible onto computer tape.—*The Wall Street Journal*

Bridal Registry Computer

Drayton's department store in Minneapolis, MN has installed touch-sensitive computer terminals in bridal registration areas. The computers are programmed with the wedding gift preferences of thousands of future newlyweds.

Under the system, a couple fills out a preference list of gifts they wish to receive, and the information is entered into the main computer in downtown Minneapolis. Friends and relatives may then "touch up" the name of the bride or groom on the terminal and receive a printed preference list.

The terminals are from Northwestern Bell Telephone Company. The system was installed by Simple Systems Inc. of Minneapolis. □

The 4th Personal Computer World Show

Cunard Hotel London 10–12 September 1981

The Show which brings your market direct to you . . .

The Personal Computer World Show is the UK exhibition exclusively for the small computer industry. It is your opportunity to meet, face-to-face, potential buyers who visit the Show specifically to see demonstrations and discuss the application of your products.

This is the Show where buyers come to buy ... not just look.

To discuss how the 4th Personal Computer World Show could form the focus of your 1981 promotional calendar contact Timothy Collins on 01-486 1951 or write to him at Montbuild Ltd. 11 Manchester Square. London. W1. ENGLAND

Software Legal Forum

Harold L. Novick

The comments and opinions of the author are given for educational purposes only and are not meant to be legal advice. Specific legal questions should be referred to your personal attorney.

Sanity has returned to the realm of software protection. It came from a most unusual source: the Supreme Court of the United States. On March 3, 1981, the Court held in *Diamond, Comm'r of Patents and Trademarks v. Diehr*, that a patent "drawn to subject matter otherwise statutory (i.e. patentable subject matter) does not become nonstatutory simply because it uses a matematical formula, computer program or digital computer." This of course does not mean that computer programs are patentable, but it does mean that an invention that includes a computer program may be patentable.

Although there is cause for careful optimism, there is at present no reason for ebullience. Mr. Justice Rehnquist wrote the majority decision in a deeply divided court that split 5-4 with Justice Stevens writing a stinging dissenting opinion. The five-vote majority for patentability was obtained from the three dissenters in the earlier "computer program" patentability case (*Parker v. Flook*) together with two converts from the 6-3 majority in that case. Perhaps Justice Stevens' dissent was so strong because the recent *Diehr* decision reversed many concepts that were present in the earlier *Flook* decision, which just so happened to have been written by Justice Stevens. In any case, it takes neither a computer nor a mathematical genius to count heads and see the tenuous nature of the latest decision.

What does seem clear, however, is that the patentability of a particular novel computer program will depend upon how the inventive concept is perceived by the court. For example, in the *Diehr* case, the majority of the court saw the invention as "a process for curing synthetic rubber which includes in several of its steps the use of a mathematical formula and a programmed digital computer." Such a process was deemed patentable subject matter. On the other hand, Justice Stevens characterized the invention for the losing minority as "an improved method of calculating the time that the mold (in a rubber molding press) should remain closed during the curing process." In *Flook*, Justice Stevens described that invention as a "formula for updating the value of an alarm limit on any process variable involved in a process comprising the catalytic conversion of hydrocarbons." As so described, Justice Stevens decided that the process is unpatentable subject matter. The losing *Flook* minority would have held the invention to be patentable subject matter because the claimed invention does not "preempt the formula or algorithm contained therein."

The thoughts and opinions of the swing justices that made the majority in *Diehr* are not known and can only be surmised on the basis of the inventions. What seems clear is that the more mathematical the inventive concept appears, the less likely that it will be considered patentable subject matter. Looking at it the other way, if the new computer program contains no mathematical equations, if it solves no mathematical algorithms, it should theoritically be patentable subject matter.

Does that mean that firmware which regulates the internal operation of a computer and does not contain a mathematical algorithm is patentable subject matter? That was the question in *Diamond, Comm'r of Patents & Trademarks v. Bradley*, the companion case to *Diehr*. The Court of Customs and Patent Appeals had reversed the decision of the Patent & Trademark Office and held that the patent application for a "Switch System Base Mechanism" contained patentable subject matter. The lower court said that the analysis by the Patent and Trademark Office "confuses *what* the computer does with *how* it is done"; just because "digital computers normally operate in some numerical radix" does not mean that "the significance of the data and their manipulation in the real world" (what the computer is doing) is mathematical. A real world view would, for example, according to the court, be the solution of the Pythagorean theorem (unpatentable) or the manipulation of the contents of a page of the Milwaukee telephone directory (possibly patentable). The computer may work mathematically internally, but the invention must be characterized by the external view of what is being done. If the invention were claimed in Bradley to be "the information embodied in the firmware or the firmware itself, *per se*, a different case would be presented." However, the invention claimed was "a combination of hardware elements, one of which happens to be a portion of the computer's control store microprogrammed in a particular manner." When examined as a whole, the lower court determined that the invention did not contain any "*mathematical* algorithm."

So what did the Supreme Court do? It did nothing on March 3, 1981 when it reported the *Diehr* decision. It took a whole week before the Supreme Court tersely announced on March 9th that the

Legal Forum, continued...

vote was 4 to 4 with the Chief Justice abstaining. Remember, the Chief Justice sided with the majority in the *Diehr* case. A tie vote means that the Court affirms the lower court's decision. As stated above, this means that the claimed invention was for patentable subject matter. Because the Supreme Court gave no opinion, just the results, all that is left is the lower court's opinion, the Supreme Court's opinion, in *Diehr*, and the reality that a switch in one vote could spell unpatentability of a computer program related invention.

On the other hand, all is not lost. It could be years before the Supreme Court considers the question again. At least now one has a good idea of what one can get away with.

It now appears that the two step test annunciated by the Court of Customs and Patent Appeals (CCPA) in the *Freeman* case (573 F.2d 1237) and modified in the *Walter* case (205 USPQ 397) which become the operative guide line to determine whether a particular computer program is patentable subject matter. The first step is to determine "whether the claim (the legal description of the invention) directly or indirectly recites an 'algorithm' in the *Benson* sense of that term (i.e., a mathematical formula)." No algorithm, patentable subject matter; Algorithm, go to step two.

In *Benson*, the first computer-related invention examined by the Supreme Court, the claim was a method of converting signals from binary coded decimal (BCD) form into binary (B) comprising: (a) storing the BCD signals in a reentrant shift register; (b) shifting the signals to the right by at least 3 places until there is a 1 in the second position; (c) masking out this 1; (d) adding a 1 to the first position; (e) left shifting by two positions; (f) adding a 1 to the first position; and (g) right shifting by at least 3 positions in preparation for a succeeding binary 1 in the second position. That was it: a pure mathematical algorithm even though there was no formula and even though "signals" and "numbers" were stored in a "shift register" and not abstractly. The claim in the *Diehr* case also contained a mathematical algorithm; in fact, a pure mathematical equation. However, the claim in the *Bradley* case contained no such algorithm. This claim was for a data structure (e.g. a ROM) for storing coded signals for communicating with an operating system and scratchpad registers comprising: (a) a first means in data structure for storing coded signals indicative of an address (b) second means in the first means for storing coded signals indicating priority; (c) third means in the data structure for storing coded signals indicative of a further address; (d) and for means for generating signals for exchanging information from the data structure to the scratchpad registers. According to the CCPA test, no mathematical algorithm means it is patentable. Thus the *Bradley* invention is patentable and the *Benson* and *Diehr* inventions require going to the second step of the test.

If a mathematical algorithm is present in the claim, the second step of the test requires that "the claim be further analyzed to ascertain whether in its entirety it wholly preempts that algorithm." The "preemption" approach requires an analysis to establish the relationship between the algorithm and the physical steps of a process claim or the elements of an apparatus claim. A claim contains statutory subject matter if the "mathematical algorithm is implemented in a specific manner to define structural relationships between the physical elements of the claim (in apparatus claims) or to define or limit claim steps (in process claims)."

In the *Benson* case, the algorithm was merely presented and solved. Hence unpatentable subject matter. The *Diehr* invention, however, involved a mathematical calculation that was "intimately entwined with a rubber molding process," not one that merely generated a new number. The invention was claimed as a method for operating a rubber molding press with the aid of a digital computer and comprised: (a) providing the computer with a data base, (b) initiating an internal timer when the press is closed; (c) constantly determining the temperature of the mold during molding and constantly providing it to the computer; (d) repetitively comparing in the computer at frequent intervals the calculated and measured time; and (f) automatically opening the press when there is equivalence. The *Diehr* claim, said the Supreme Court, applies the mathematical formula in a structure of process which, when the claim is considered as a whole, is performing a patentable function (transforming or reducing an article to a different state or thing).

Whether a particular computer program is patentable now depends upon it being novel and unobvious over known programs and not being directed merely to solving a mathematical equation. Each program must be individually examined to determine whether that concept passes muster under the two step test. Whether a particular computer program should be patented still depends upon a broad economic analysis of all of the alternative means for protection. Whether particular computer programs should be analyzed in future "Forums" will depend upon the interests of the readership. In any case, the "Forum" returns next month to continue the discussion of the rights of the buyer of computer programs. □

COTTAGE SOFTWARE

PACKER: Automatically edits all or part of your Basic program to ease editing, run faster, or save memory. Has 5 sections: UNPACK—unpacks multiple statement lines into single statements maintaining program logic, inserts spaces and renumbers lines for easier editing; SHORT—shortens your program by editing out all REM statements, unnecessary words and spaces; PACK—executes UNPACK & SHORT then packs lines into multiple statement lines; maintains program logic; RENUM—renumbers program lines including all branches. You specify increment; MOVE—moves any line or block of lines to any new location in the program and renumbers as desired. Written in machine language. Supplied on tape in 3 versions for 16K, 32K, & 48K.
For TRS-80 Level III or Disk Basic.....$29.95

FAST SORT ROUTINES: for use with Radio Shack's Accounts Receivable, Inventory Control I, & Disk Mailing List Systems for Model I Level II. Sorts in SECONDS! You'll be amazed at the time they can save. Supplied on data diskette with complete instructions.
FAST SORT for Accounts Receivable.....$19.95
FAST SORT for Inventory Control I.....$19.95
FAST SORT for Disk Mailing List (specify data diskette or tape for one drive system).....$14.95
ALL THREE ROUTINES.....$44.95

SYSTEM TAPE DUPLICATOR: Copy your system format tapes. Includes verify routine.
For any TRS-80 Level II.....$14.95

CASSETTE LABEL MAKER: A mini word processor to print cassette labels on a line printer. Includes manual and 50 peel-and-stick labels on tractor feed paper.
For TRS-80 Level II & printer.....$15.95

4116 RAM CHIPS—Tested!! Guaranteed for 1 year to the original purchaser.....16K for $49.95

MANY MORE items available. Call or write for catalog. VISA & MASTERCHARGE accepted. Dealer inquiries invited. Kansas residents add 3% sales tax.
Foreign orders in US currency only.
On line catalog on Wichita FORUM-80: 316-682-2113
Or call our 24 hour phone 316-683-4811 or write:
COTTAGE SOFTWARE
614 N. HARDING
WICHITA, KS 67208

TRS-80™ is a trademark of Radio Shack, a Tandy Corp.

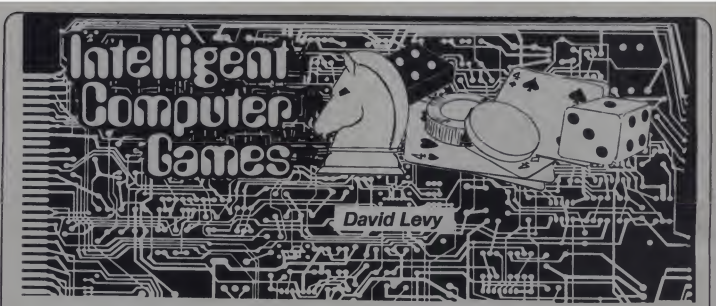
CIRCLE 161 ON READER SERVICE CARD

dyS an
Dysan CORPORATION

Solve your disc problems, buy 100% surface tested Dysan diskettes. All orders shipped from stock, within 24 hours. Call toll FREE (800) 235-4137 for prices and information. Visa and Master Card accepted. All orders sent postage paid.

PACIFIC EXCHANGES
100 Foothill Blvd
San Luis Obispo, CA
93401 (In Cal call
(805) 543-1037)

CIRCLE 169 ON READER SERVICE CARD



Correspondence is welcome. Letters with interesting questions and ideas will be used in the column along with a response. No personal replies can be made. Send to: David Levy, 104 Hamilton Terrace, London NW8 9UP, England

Last month we discussed the game of Stud Poker in a simplified, two-handed form. We saw how it is possible to predict an opponent's hidden card from information gained during the betting, and from these predictions we developed an algorithm for deciding whether or not to bet. This month we shall turn our attention to Draw Poker, which may be better known to readers than Stud, but in my opinion is not nearly as exciting to play.

In Stud Poker the ever-changing nature of each hand, as new cards are dealt face-up to each player, adds a whole new dimension of complexity. I have always enjoyed Stud Poker much more than Draw, but this preference is purely personal, and I know that there are millions of Draw Poker addicts in the world so, who am I to discourage them.

One major difference between last month's article and this, is that here we shall consider a game for more than two players. Draw Poker for two would be extremely dull. The ideal number is six or seven players. When writing your program I would suggest that you make the number of players variable, at the user's discretion. The principles that I am about to outline are equally applicable for any number of players.

The Rules of the Game

At the start of a hand, each player is dealt five cards face down, which he may look at. No one else sees any of these cards. The player on the dealer's left usually opens the betting. There are various ways in which this is done; in some cases it is mandatory to bet, in other schools it is illegal to bet unless holding at least a pair of jacks. We shall assume that the first player may bet or check at will. (Incidentally, if you do not understand some of the terminology, rush out and buy last month's magazine.)

The betting proceeds with each player having the option, when it is his turn to bet, of either dropping out of the pot ("passing" or "folding") or putting in at least as much as has been put in since he last bet ("calling" or "raising"). When all of the active players have put the same amount of money into the pot, the first round of betting is over. The remaining players may then discard some of the cards in their hands, and receive in their place an equal number of new cards from the unseen deck. This process, known as the draw, is conducted in clockwise order starting on the dealer's left, so the dealer is the last player to draw new cards.

Once all the players have taken their turn to draw, a second round of betting takes place. When all remaining players have put the same amount of money into the pot, the second round of betting is over. The players all turn their cards over, and the one with the highest hand takes the pot. The order of importance of the hands is exactly the same as for five-card Stud (see last month's article).

Basis of the Algorithm

At the start of a hand of Draw Poker, no-one *knows* anything about anyone else's cards, unlike Stud Poker in which at least one of the opponent's cards is visible from the outset. But by employing simple probabilities, it is possible to make certain estimates about the type of hand which a player is holding.

The probability of being dealt a straight flush is 1 in 64974, or 0.0000153. The probability of being dealt the various other types of hand are shown in Table 1.

From this table we can determine the probability that an oppontent has a certain type of holding after the cards are dealt, and it is an easy matter to work out the probability that the program holds better cards. For example, if the program holds a pair of aces, the probability of a particular opponent having been dealt better cards is simply the sum of the probabilities of being dealt two pairs, three of a kind, straight, flush, full house, four of a kind and straight flush. While if the program was dealt a full house, aces and (say) twos, the probability that it was already beaten is the sum of the probabilities of the opponent being dealt four of a kind and a straight flush.

Thus, without any information gleaned from the betting or the other aspects of play, the program already knows something about the probability that it is winning at this stage of the game.

Table 1: Probability of being dealt certain poker hands

Four of a kind:	1 in 4165	or	0.00024
Full House:	1 in 694	or	0.00144
Flush:	1 in 509	or	0.00196
Straight:	1 in 255	or	0.00392
Three of a kind:	1 in 47	or	0.02128
Two Pairs:	1 in 21	or	0.04762
One Pair:	1 in 2.37	or	0.42194
No pair (high card only):	1 in 1.99	or	0.50251

SORCERER SOFTWARE
from QUALITY SOFTWARE

All Programs Are On Cassette

ARROWS AND ALLEYS™

arcade-like action at its best!

The latest of Quality Software's great arcade games for the Sorcerer is ARROWS AND ALLEYS, by Vic Tolomei. You drive your car in a maze of alleys. Your task is to eliminate a gang of arrows that constantly pursues you. You have a gun and the arrows don't, but the arrows are smart and they try to stay out of your sights and will often attack from the side or from behind. Eliminate the arrows and another, faster gang comes after you. Four levels of play. Requires 16K or more of RAM. $17.95

BEDIT by Ernest Bergmann. A BASIC editor. This short and easy to use program is a machine language routine that loads in low memory and allows you to edit your BASIC programs by modifying text on the video screen. No more retyping a long line just to change one character. A few cursor movements make the necessary modifications. Even renumbering lines is easy to do. This program is a real timesaver. Runs on any size Sorcerer. $11.95

FORTH for the Sorcerer. Now Sorcerer owners can enjoy the convenience and speed of the fascinating FORTH programming language. Based on Ig-FORTH and adapted for the Sorcerer by James Albanese, this version uses simulated disk memory in RAM and does not require a disk drive. Added to standard Ig-FORTH are an on-screen editor, a serial RS-232 driver, and a tape save and load capability. Numerous examples are included in the 130 pages of documentation. Requires 32K or more of RAM.
price before June 1, 1981: $49.95
price after June 1: $59.95

GRAPHICS ANIMATION by Lee Anders. This package provides the BASIC programmer with a powerful set of commands for graphics and animation. The program is written in machine language but is loaded together with your BASIC program and graphics definitions with a LOAD command. Any image from a character to a large graphic shape may be plotted, moved, or erased with simple BASIC commands. Encounters of plotted character sets with background characters are detected and background images are preserved. Contains a medium resolution plotting routine. A keyboard routine detects key presses without carriage returns. Includes a separate program for constructing images. Runs on any size Sorcerer. $29.95

QS SMART TERMINAL by Bob Pierce. Convert your Sorcerer to a smart terminal. Used with a modem, this program provides the capability for you to communicate efficiently and save connect time with larger computers and other microcomputers. The program formats incoming data from time-sharing systems such as The Source for the Sorcerer video. Incoming data can be stored (downloaded) into a file in RAM. Files, including programs, may be saved to or loaded from cassette, listed on the video, transmitted out through your modem, or edited with an on-board text editor. Interfaces with BASIC and the Word Processor Pac. $49.95

****

USE YOUR SORCERER FOR BUSINESS?

Quality Software is currently preparing release of two cassette based business programs — a word processor at only $59.95 and a general business systems package at $99.95 that can be used for mailing lists, payroll, inventory, or accounts receivable. Both are written in machine language. Call us for details.

****

We have more than 20 programs for the Sorcerer
PLEASE WRITE FOR OUR CATALOG

QS QUALITY SOFTWARE
6660 Reseda Blvd., Suite 105, Reseda, CA 91335
Telephone 24 hours, seven days a week: (213) 344-6599

HOW TO ORDER: If there is no SORCERER dealer near you, you may order directly from us. MasterCard and Visa cardholders may place orders by telephone. Or mail your order to the address above. California residents add 6% sales tax. Shipping Charges: Within North America orders must include $1.50 for first class shipping and handling. Outside North America the charge for airmail shipping and handling is $5.00 — payable in U.S. currency.

*This name, "SORCERER," has been misappropriated by Exidy, Inc.

CIRCLE 195 ON READER SERVICE CARD

be good to your sprouts...

give them a program of their own from Strawberry Software

Sprouts #1

Two programs on one cassette. JESSE'S BUSY BUGS charms the very young sprout — and teaches him to associate keyboard and screen with his own actions.

We've had children from 5 mos. to 4 yrs. who liked Jesse's, though it was written for 1½-3 yr olds—

When a child presses any key, he creates a musical phrase — when he doesn't press a key, the screen is alive with a variety of odd graphic "bugs", scampering in various directions.

Pressing keys in quick succession produces continuous little melodies. The program also includes a Teacher's Aid which analyzes the player's attention to visual vs. auditory stimulus.

Then there's SO BIG, so small — a graphics/sound game for the older, more experienced sprout—

SHAPE KEYS! Key 1 creates a triangle. Key 2 creates a square. Key 3 creates a vertical rectangle. Key 4 creates a horizontal rectangle.

SIZE KEYS! Key 8 makes the created shape smaller. Key 9 makes it larger.

When a Shape key is pressed, the corresponding shape is created in the center of the screen, accompanied by a small musical phrase. To change color, the same key is pressed again. Using a Size key, the shape can then be made bigger or smaller at will.

By superimposing these shapes the player can create an infinite variety of complex patterns, all of which is a preparation for reading.

Written for 3-5 year olds, SO BIG is nevertheless a favorite for some adults in our family.

Color Computer & TRS-80, Mod. I

VISA & MASTERCHARGE — *Color Computer & TRS-80 are Tandy Corp.*

Counters is a graphics/sound game of basic number concepts for young children. For TRS-80 mod I & color computer (16K) Catalog

The Changer converts your TV to ever-changing color & melody/color computer only. Quick Plan, for personal projects. For TRS-80 mod I (16)

Any cassette $14.95 + $1.50 shipping available now from

strawberry software inc.

206-463-3707

BOX 743, VASHON ISLAND, WA. 98070

Intelligence for small computers

CIRCLE 200 ON READER SERVICE CARD

Games, continued...

To employ such probabilities with any real degree of accuracy throughout the game, we must introduce a greater degree of discrimination than that achieved by dividing all possible hands into the nine categories listed above. I am indebted to my friend Stewart Reuben, one of Britain's leading poker players (and one-time poker columnist of "Mayfair"), for the following division into 109 categories. This list should be coded into your poker program in such a way as to assign a two-part probability estimate to each holding for each player it the game (apart from the program itself, which of course knows what it is holding).

A few comments are required on the above division into 109 types of holding:

A) Hand number 5—four cards to an inside straight or a straight open at only one end: In a situation with 4,5,6,8,J, by discarding the jack it is possible to draw one card which will make a straight, provided that card is a 7. Similarly, when holding 8,J,Q,K,A, by discarding the 8 and drawing a 10 it is possible to make the straight. In each of these situations there is only one card denomination which will suffice to make the straight, whereas with a holding such as 2,6,7,8,9, it would be possible to discard the 2 and make a straight by drawing *either* a 5 or a 10. We must therefore distinguish between a situation in which only one denomination will suffice, and a situation in which either of two cards will bring joy to our hearts. The reason for this distinction is ovbious—it is twice as easy to make a straight when any one of eight cards will work, as it is when any one of four cards will do.

B) There are more ace high flushes than there are flushes with any other card high (think about it if you do not believe me). So to have an ace high flush in the making is much better than to have a chance of making just any old flush. Hence the distinction between hands 7 and 8.

C) When holding three kings it is useful to have an ace as one of two remaining cards, as this substantially reduces the chance of an opponent having or drawing three aces. This explains the distinction between holdings 49 and 50, and for a similar reason we must distinguish between holding 83 and 84, since it is very useful when holding a full house of kings to know that one of the aces is already denied your opponent, who therefore has much less chance of holding or drawing a full house of aces. Similarly, the distinction between hands 98 and 99.

Since we know the probability of a particular opponent being dealt a particular type of hand, we can calculate the probability of his holding any of the above 109 hands after the cards are first dealt. To do this accurately we would need to calculate exactly how many hands exist of each of the 109 types, and then divide this number by 2598960, which is the total number of possible hands in a 52-card deck with no wild cards.

Numerical Designation of the Various Possible Holdings in 5 Cards

no hand	1
3 cards to a flush	2
3 cards to a straight flush	3
Ace high	4
4 cards to a straight missing inside card or open only at one end (i.e. only cards of one denomination will make the straight)	5
4 cards to an open ended straight	6
4 cards to a flush without an ace	7
4 cards to a flush with an ace	8
4 cards to a straight flush missing inside card	9
4 cards to a straight flush including ace low	10
4 cards to a straight flush including ace high	11
4 cards to an open ended straight flush	12
Pair of 2s	13
Pair of 3s	14
Pair of 4s	15
..... etc.	
Pair of aces	25
Two Pairs, 3s and 2s	26
Two Pairs, 4s high	27
Two Pairs, 5s high	28
..... etc.	
Two Pairs, aces high	37
Three 2s	38
Three 3s	39
Three 4s	40
..... etc.	
Three kings with an ace	50
Three aces	51
Straight (A,2,3,4,5)	52
Straight (2,3,4,5,6)	53
Straight (3,4,5,6,7)	54
..... etc.	
Straight (10,J,Q,K,A)	61
Flush (7 high)	62
Flush (8 high)	63
Flush (9 high)	64
..... etc.	
Flush (ace high)	69
Flush (ace, Q high)	70
Flush (ace, K high)	71
Full House (2s)	72
Full House (3s)	73
Full House (4s)	74
..... etc.	
Full House (Ks)	83
Full House (Ks over A)	84
Full House (Aces)	85
Four 2s	86
Four 3s	87
Four 4s	88
..... etc.	
Four Ks with an ace	98
Four aces	99
Straight Flush 5 high	100
Straight Flush 6 high	101
Straight Flush 7 high	102
..... etc.	
Straight Flush A high	109

The approximation that we shall use in this article is based on taking the probability of being dealt a particular category of hand (see Table 1) and then dividing this by the number of types of hand within this category. Special calculations may be made for designations 1-12, but I doubt that this would improve the performance of the program, as any player holding a hand worse than 13 after the draw would (or should) certainly fold.

The probability of being dealt one pair is 0.42194. Since there are 13 possible pairs that one can have, the probability of being dealt a pair of 2s is 0.42194 x 1/13, or 0.0325.

The probability of being dealt a pair of 3s or a pair of anything else is also 0.325, so we can assign to holdings 13 through 25 initial probability values of 0.0325. Up to now we have not used any approximation.

The probability of being dealt two pairs is 0.04762, but this total probability is not evenly split among two pairs (3 high), two pairs (4 high), ... two pairs (ace high), because while there is only one way that a player can have two pairs 3s high (i.e. two 3s and two 2s), there are two ways that he can have two pairs 4s high (i.e. two 4s and two 3s, or two 4s and two 2s), and there are three ways that he can have two pairs 5s high (two 5s and two 4s, two 5s and two 3s, two 5s and 2s). It is easy to see that if you do not wish to follow my approximation, you can assign accurate probability estimates to holdings 26 through 37 by dividing the total probability of 0.04762 in ratio 1:2:3:4:5 ... :12. Alternatively, you can start with equal probability estimates for each type of hand, making all of them 0.04762 x 1/12, or 0.00397.

When this process has been completed, your program will have probability estimates for each of 109 designations, these probabilities representing the likelihood that a player will be dealt a hand of this type in his first five cards.

These probabilities form the basis of our Draw Poker algorithm.

How the Algorithm Operates

Let us assume at the outset that there is no bluffing in our games. We can therefore deduce that when a player bets or raises he is indicating a strong hand, relative to some arbitrary point, and that if he checks or calls he is indicating a weak hand relative to that arbitrary point. As the betting proceeds, during the first round, players are repeatedly faced with a situation in which they must either fold, or put in more money knowing that other players have bet or raised. This point is very useful—a player who puts in money

creative computing

Term	USA	Canada and Foreign Surface	Foreign Air
1-yr (12 issues)	☐ $20	☐ $29	☐ $50
2-yr (24 issues)	☐ 37	☐ 55	☐ 97
3-yr (36 issues)	☐ 53	☐ 80	☐ 143

☐ New ☐ Renewal

☐ Payment enclosed
☐ Visa ☐ Master Card ☐ American Express

Card No. _____

Expiration date _____

Signature _____

Name _____

Address _____

City _____

State _____ Zip _____

Send to Creative Computing, P.O. Box 789-M, Morristown, NJ 07960, USA.

Get the most out of your computer!

Creative Computing, the Number 1 applications and software magazine is packed with pragmatic, well-documented programs for all kinds of computers from small to large.

In-depth Evaluations

Objective, probing evaluations of software and hardware help you make well-informed purchase decisions. More than once, our hard-hitting, honest evaluations have cost us an advertiser, however we feel that our first obligation is to you, our reader.

Programming Techniques

Creative presents innovative and useful programming ideas. For example, six entirely different sort methods appeared in recent issues. We try to make material understandable to the newcomer as well as interesting for the experienced user.

Subscribe Today

Mail the card in the back or this form (in an envelope) with your payment or credit card number. Or call toll free **800-631-8112** (In NJ, 201-540-0445).

The story behind the two best selling computer games books in the world.

Computer Games

by David H. Ahl

Everybody likes games. Children like tic tac toe. Gamblers like blackjack. Trekkies like Star Trek. Almost everyone has a favorite game or two.

It Started in 1971

Ten years ago when I was at Digital Equipment Corp. (DEC), we wanted a painless way to show reluctant educators that computers weren't scary or difficult to use. Games and simulations seemed like a good method.

So I put out a call to all our customers to send us their best computer games. The response was overwhelming. I got 21 versions of blackjack, 15 of nim and 12 of battleship.

From this enormous outpouring I selected the 90 best games and added 11 that I had written myself for a total of 101. I edited these into a book called 101 Basic Computer Games which was published by DEC. It still is.

When I left DEC in 1974 I asked for the rights to print the book independently. They agreed as long as the name was changed.

Contents of *Basic Computer Games* (right) and *More Basic Computer Games* (below).

Artillery-3
Baccarat
Bible Quiz
Big 6
Binary
Blackbox
Bobstones
Bocce
Boga II
Bumbrun
Bridge-It
Camel
Chase
Chuck-A-Luck
Close Encounters
Column
Concentration
Condot
Convoy
Corral
Countdown
Cup
Dealer's Choice
Deepspace
Defuse
Dodgem
Doors
Dreg
Dr. Z
Eliza
Father
Flip
Four In A Row
Geowar
Grand Prix
Guess-It
ICBM
Inkblot
Joust
Jumping Balls
Keno
L Game
Life Expectancy
Lissajous
Magic Square
Man-Eating Rabbit
Maneuvers
Mastermind
Masterbagels
Matpuzzle
Maze
Millionaire
Minotaur
Motorcycle Jump
Nomad
Not One
Obstacle
Octrix
Pasart
Pasart 2
Pinball
Rabbit Chase
Roadrace
Rotate
Safe
Scales
Schmoo
Seabattle
Seawar
Shoot
Smash
Strike 9
Tennis
Tickertape
TV Plot
Twonky
Two-to-Ten
UFO
Under & Over
Van Gam
Warfish
Word Search Puzzle
Wumpus 1
Wumpus 2

Introduction
The Basic Language
Conversion to Other Basics
Acey Ducey
Amazing
Animal
Awari
Bagels
Banner
Basketball
Batnum
Battle
Blackjack
Bombardment
Bombs Away
Bounce
Bowling
Boxing
Bug
Bullfight
Bullseye
Bunny
Buzzword
Calendar
Change
Checkers
Chemist
Chief
Chomp
Civil War
Combat
Craps
Cube
Depth Charge
Diamond
Dice
Digits
Even Wins
Flip Flop
Football
Fur Trader
Golf
Gomoko
Guess
Gunner
Hammurabi
Hangman
Hello
Hexapawn
Hi-Lo
High I-Q
Hockey
Horserace
Hurkle
Kinema
King
Letter
Life
Life For Two
Literature Quiz
Love
Lunar LEM Rocket
Master Mind
Math Dice
Mugwump
Name
Nicomachus
Nim
Number
One Check
Orbit
Pizza
Poetry
Poker
Queen
Reverse
Rock, Scissors, Paper
Roulette
Russian Roulette
Salvo
Sine Wave
Slalom
Slots
Splat
Stars
Stock Market
Super Star Trek
Synonym
Target
3-D Plot
3-D Tic-Tac-Toe
Tic Tac toe
Tower
Train
Trap
23 Matches
War
Weekday
Word

Converted to Microsoft Basic

The games in the original book were in many different dialects of Basic. So Steve North and I converted all the games to standard Microsoft Basic, expanded the descriptions and published the book under the new name Basic Computer Games.

Over the next three years, people sent in improved versions of many of the games along with scores of new ones. So in 1979, we totally revised and corrected Basic Computer Games and published a completely new companion volume of 84 additional games called More Basic Computer Games. This edition is available in both Microsoft Basic and TRS-80 Basic for owners of the TRS-80 computer.

Today Basic Computer Games is in its fifth printing and More Basic Computer Games is in its second. Combined sales are over one half million copies making them the best selling pair of books in recreational computing by a wide margin. There are many imitators, but all offer a fraction of the number of games and cost far more.

The games in these books include classic board games like checkers. They include challenging simulation games like Camel (get across the desert on your camel) and Super Star Trek. There are number games like Guess My Number, Stars and Battle of Numbers. You'll find gambling games like blackjack, keno, and poker. All told there are 185 different games in these two books.

Whether you're just getting started with computers or a proficient programmer, you'll find something of interest. You'll find 15-line games and 400-line games and everything in between.

The value offered by these books is outstanding. Every other publisher has raised the price of their books yet these sell for the same price as they did in 1974.

Moneyback Guarantee

Examine one or both of these books and key some games into your computer. If you're not completely satisfied we'll refund the full purchase price plus your return postage.

Basic Computer Games costs only $7.50 and More Basic Computer Games just $7.95 for either the Microsoft or TRS-80 edition (please specify your choice on your order). Both books together are $15. Send payment plus $2.00 shipping and handling to Creative Computing Press, Morris Plains, NJ 07950. Visa, MasterCard and American Express orders should include card number and expiration date. Charge card orders may also be called in toll-free to 800-631-8112 (In NJ 201-540-0445).

Order today to turn your computer into the best game player on the block.

creative computing

Morris Plains, NJ 07950
Toll-free **800-631-8112**
(In NJ 201-540-0445)
CIRCLE 350 ON READER SERVICE CARD

knowing that other players have indicated strength, must himself be indicating more strength than he would be indicating if no one else had yet bet. In other words, the arbitrary point has moved upwards. A player who raises during the betting when there have already been ten raises before him, must have a fairly strong hand: after all, the other players are raising each other, and with each raise there is an implicit "I think that my cards are better than yours." So to be in the pot after several raises requires a strong hand.

When the cards are dealt, each player will have, on average, a hand whose designation lies somewhere just below 13. This is known from Table 1, which indicates that there is a slightly less than 50% chance of being dealt a pair or better. So at the start of each hand the program should assign to each of his opponent's designation lists, a pointer which is set on 12 or 13 (12 if you want the program to be slightly optimistic, 13 if you wish it to be slightly conservative). As each player puts in money, the program should adjust the position of that player's pointer, to indicate what it thinks the player's *minimum* holding is. This process can be accomplished in the following way, though the reader may find it preferable to vary the size of jump made by the pointer, in accordance with how his program reacts.

When a player checks his pointer is not moved. If he calls or raises however, his pointer is moved up by: 5% x (number of designations between present and 109) x number of raises, where number of raises indicates how many players have raised the pot since this particular player last put in money. If he himself is raising, this raise is included in the number of raises.

Table 3 should explain how the method works. We assume that there are five players, called A, B, C, D and E. Each of them has his pointer set initially at 12. A is the first to speak, since the player on his right (E) dealt.

Since the last four players have all called, the first round of betting is now at an end. The program has set the pointer for each of the players at 31, indicating that it expects each of them to have not less than two pairs, 8s high.

The next stage is to adjust the probabilities for all the hands of designation 31 through 109, so that they add up to 1. The ratio of these probabilities is already known, it is simply the ratio of the initial probabilities as calculated from Table 1 by dividing the categories of hands into the 109 types of hand. The program merely adds up all the probabilities for hand designations 31 through 109, and then divides each of them by the total, to arrive at a new measure for each. This new measure will keep the probabilities in the same ratio as before, while ensuring that their sum is 1.

A checks, pointer remains at 12.
B bets, pointer moves up by 5% x (109-12) x 1 = 4.85, to 17 (rounded)
C raises, pointer moves up by 5% x (109-12) x 2 = 9.7, to 22 (rounded)
D calls, pointer moves up by 5% x (109-12) x 2 = 9.7, to 22 (rounded)
E raises, pointer moves up by 5% x (109-12) x 3 = 14.55, to 27 (rounded)
A calls, pointer moves up by 5% x (109-12) x 3 = 14.55, to 27 (rounded)
B raises, pointer moves up by 5% x (109-17) x 3 = 13.8, to 31 (rounded)
C calls, pointer moves up by 5% x (109-22) x 2 = 8.7, to 31 (rounded)
D calls, pointer moves up by 5% x (109-22) x 2 = 8.7, to 31 (rounded)
E calls, pointer moves up to 5% x (109-27) x 1 = 4.1, to 31 (rounded)
A calls, pointer moves up to 5% x (109-27) x 1 = 4.1, to 31 (rounded)

Table 3.

In fact this adjustment can be made during the betting process. As a player bets, calls or raises, his pointer is adjusted. The probability measures can also be adjusted in the manner described in the preceding paragraph. The program may then make its betting decisions based on up-to-date information about the estimated strength of each of its opponents' hands.

What Happens During the Draw

The program, if it is still in the pot after the first round of betting, must then make a decision as to how many cards to throw away in the hope of drawing a better hand. This decision is often obvious and unambiguous, for example holding four cards to a straight or a flush and a completely disconnected card, it will always throw the disconnected card and hope to make a straight or flush.

On the other hand, when holding three of a kind, many players prefer to discard one card rather than two, since the reduced chance of making four of a kind is partly compensated for by the fact that a single discard disguises your hand (you might have four cards to a straight, four to a flush, four to a straight flush, or two pairs). Your program should have a set of rules telling it what to discard according to what designation holding it has. Where there is a choice of discard, it should choose at random between two possible discards to disguise its play and confuse the opposition.

A certain amount can be learned from the number of cards discarded by the opponent, and I would suggest adjusting the probabilities for players who discard certain numbers of cards. For example, a player discarding three cards must be assumed to be holding a pair. Make the probabilities so that they add up to 1.

A player discarding one card can be assumed not to have a pair so set all of his pair probabilities to 0 and adjust the other probabilities accordingly. (If his pointer is already at 26 or higher you need take no action, since it is already assumed that he does not hold less than two pairs.)

A player who discards four or five cards (five is prohibited in some schools) should be assumed to have designation 4 (if he discards four cards, assume that he has kept an ace), or designation 1 (if he discards five cards).

A player who stands pat, i.e takes no cards at all, should be assumed to have at least designation 52, though when bluffing is added to your program you should allow for the "no card bluff" in a certain proportion of hands, and assume a lower minimum designation.

Estimating How Hands Improve During the Draw

All good books on poker give tables to show the odds against making various types of improvement to your hand during the draw. For example, Irwin Steig's *Poker for Fun and Profit*, teaches that when holding a pair and discarding three cards, the probability of making a full house is 0.0102, of making two pairs 0.00278, of making three of a kind 0.1149, and of making two pairs 0.1587. We can use this information to adjust the probabilities still further.

Let us assume that after the first round of betting the pointers are all on 24 (a pair of kings). A player discards three cards, so we assume that he does, indeed, have a pair, and the designation probabilities are adjusted accordingly. We must then assume, after the draw, that the probabilities of his holding four of a kind, a full house, three of a kind and two pairs, are given by the above figures, and that the balance (0.7143) is the probability of his holding a pair after the draw. Having determined the probabilities for each of the feasible categories of hand, we can divide them up to indicate the probability of his holding each of the feasible types of hand (remember that some types, such as straights and flushes, are no longer feasible after the three card draw).

After the Draw is Over

The program now has at its disposal an updated list of probabilities and a pointer, all this for each player. The second round

Powerful & Efficient Apple Software

SDS Guarantees It.

You depend on good software to save you time and to have your computer help you do a job more efficiently. Our software is designed to do just that! We are one of the oldest companies supplying software for the Apple II*, and one of the very few that offers an unconditional guarantee of satisfaction or your money back! Here are a few that you'll want to add to your library:

Super Terminal Software

ASCII EXPRESS II, by Bill Blue. The most complete communications package available for the Apple II. Designed for the most efficient transfer of data to or from practically **any** online computer. Fully supports upper/lower case, including characters normally unavailable: underscore, rubout, break, and most others. Keyboard **macros** allow you to define dual keystrokes as entire strings for fast sign-ons, sign-offs, and system commands. A 20K data buffer allows for large files, and a convenient line editor means easy editing before and after transfer. Buffer can be output to printer, disk, or viewed at any time. Supports Micromodem II* and most other communication devices.

Price: $64.95 on Disk

And for the Z80 Apple...

Z-TERM, by Bill Blue. A flexible communications package for the Apple II equipped with Z80 Softcard* and the CP/M* environment. Allows file transfers to or from all types of dial-in systems. Fully supports Micromodem II and most other communication devices, as well as 80 column display boards and external terminals! Utilizes standard CP/M sequential text files, with up to a 40K internal buffer (using additional RAM or Language Card.) Supports multiple modes of data transfer and includes keyboard **macros**, autodial (with Micromodem II), and upper/lower case.

Price $99.95 on 16 sector diskette

Also available...

APPLE-DOC, by Roger Wagner. A set of several utilities to speed up software development and customization. **Vardoc** makes a list of all the variables in a program and every line on which they occur. Also allows you to create a list of descriptors of what each one does. **Linedoc** makes a similar list for each line/subroutine called by a GOTO, GOSUB, etc. **Condoc** is similar but documents all numeric constants — great for scientific & business uses! **Replace** is a powerful replacement editor which makes changing any occurance of a variable or group of statements a breeze!

Price: $34.95, Disk

THE CORRESPONDENT, by Roger Wagner. An extremely versatile program! Designed primarily for writing letters and other documents in a very visual way. The Apple screen acts as a "window" onto a 40-80 column page. 4-directional scrolling lets you see any part of the page just as it will be printed. Editor functions include full upper/lower case & control chars., block move/copy, split screen option, even math functions! Additional utilities & uses include printing form letters, a free-form database, putting bi-directional scrolling in your own programs, single-disk copy program, DOS remove for greater storage on diskettes, and more!

Price: $44.95 on Disk.

*Apple II is a registered trademark of Apple Computer Co.
*Micromodem II is a registered trademark of Hayes Microcomputer Products, Inc.
*Z80 Softcard is a registered trademark of Microsoft Consumer Products, Inc.
*CP/M is a registered trademark of Digital Research, Inc.

All programs require 48K and Applesoft in ROM or language card. Specify DOS 3.2 or 3.3. California residents add 6% ta all prices.

See these and other S.D.S. products at your local dealer, or for more information, write or call

SDS

southwestern data systems

P.O. Box 582-M • Santee, CA 92071 • (714) 562-3670

CIRCLE 203 ON READER SERVICE CARD

LISP

for TRS-80 Models I & III

SuperSoft LISP allows the TRS-80 to become a complete Artificial Intelligence laboratory! It is the tool that takes you to the frontier of Computer Science.

The SuperSoft LISP is a *complete and full* implementation. (it is NOT a subset!) It contains an efficient garbage collector which optimizes the usage of user RAM, and supports the TRS-80 graphics. Below are some features:

- Runs in 16k level II (with only 6K overhead)
- Fully implements atom property list structure.
- PROG is supported.
- FUNARG device is implemented.
- Efficient garbage collection.
- Complete with LISP editor and trace.
- Allows complete range of single precision numeric data.
- Works with old as well as new ROMs.
- Contains 97 functions.
- Sample Programs.

The LISP package is supplied on tape or diskette and with a complete user manual.

cassette version: $75.00
(requires 16K level II)

Disk version: $100.00
(requires 16K disk)

(manual only: $15.00)

All Orders and General Information:
SUPERSOFT ASSOCIATES
P.O. BOX 1628
CHAMPAIGN, IL 61820
(217) 359-2112
Technical Hot Line: (217) 359-2691
(answered only when technician is available)

VISA

master charge

CIRCLE 266 ON READER SERVICE CARD

SuperSoft

First in Software Technology

TRS-80 TRADEMARK TANDY CORP

CIRCLE 266 ON READER SERVICE CARD

of betting now ensues and the pointers are adjusted as before, according to whether the player checks, bets, raises or calls. As the pointers move up and the probabilities are adjusted, so the program forms a changing picture of how its own hand compares to those of its opponents.

If the program holds two pairs and there are four other players in the pot, all raising each other, the program will soon conclude that it is very probably beaten, and will fold. On the other hand, with a good full house, and only one other player raising, the program has more reason to be optimistic about its chances. How can this optimism be made into a betting strategy?

The program decides whether or not to remain in the pot in a similar manner to the method employed in Stud Poker. It calculates the probability that it holds the best cards, and compares this with the "pot odds," the ratio of the amount of money that it must put in the pot: the amount of money already in the pot. If the odds against winning are less than the money odds, the program should play. If the odds against winning are greater than the money odds, it should fold.

To determine the odds against it winning, the program first identifies the designation of its own hand. It then adds up, for each player, the probabilities corresponding to all the hands of higher designation. This gives the probability that this particular player has a better hand than the program. If the probability that this particular player has better cards than the program is PA, then the probability that the program has better cards than player A is (1-PA). The probability that the program holds the best hand of all is therefore:

(1-PA) x (1-PB) x (1-PC) x ... etc.

Bluffing

If nobody bluffed in poker, the game would immediately lose its appeal. A program could play super-accurate poker because it could calculate the odds much quicker and more accurately than its human adversaries. But bluff is an essential element of the game.

Your program may determine when to bluff by making a decision that it will do so in a certain proportion of situations in which its opponents all appear to have weakish hands, and the program has already shown strength by its first round betting and by drawing a small number of cards (two or less). What this proportion should be is very much up to the reader, and depends on what style of game he wishes his program to play. I would suggest that your program only bluff when all of its opponents have a less than 0.1 chance of holding three of a kind or greater. Even 0.1 may be a little on the high side for a game with seven players (six plus the program), but it can be made a variable to be set at the user's discretion at the start of play.

An important part of the program will be a routine to estimate the proportion of occasions when the opponent is bluffing. This can only be done by examining the opponent's cards when the showdown takes place (i.e. all the money is in the pot and everyone turns over his cards). At this point the program can make certain deductions about whether the opponent may have over-represented his hand during the betting. For example, if a player turns out to have only a pair of 6s at the end of a hand, but has been betting in such a way as to make the program think that he had at least three of a kind, then either the player is very bad, or he has been bluffing. In either case we should allow the program to reduce the value that it places on information gained from that player's betting habits.

The program should keep track of the betting, and remember how each player bet until the hand is over. If the player turns out to have a worse hand than the program believed possible, the program should analyze how that player's pointer was adjusted, and count how many times the player bet, called or raised after this stage was reached. This number of "illicit" bets will be called BADBETS, and the total number of bets made by a player during a hand will be called ALLBETS. For every hand that is played out to a stage where the program sees the player's cards, BADBETS and ALLBETS are counted and then added to variables called BADBETSTOTAL. The quotient BADBETSTOTAL/ALLBETSTOTAL is an indication of the extent to which that player bluffs, and is called the "bluff factor" (BF).

When the program next comes to adjust the pointer for that player, it multiplies the calculated adjustment by (1-BF). This means that if the player is known to bluff all the time (i.e. BF=1), no inference about the strength of his hand will be made from his betting. But if he is known to bluff very rarely, BF will be low and the pointer adjustment will be very little changed from the calculated one.

To make the program more sophisticated, it would be relatively easy to weight recent experience more than past experience when calculating the bluff factor. For example, BF could be calculated from the relation:

NEW BF := (0.9 x OLD BF) + (0.1 x latest hand BF)

This technique would have the effect of detecting recent changes in playing style by the opponent. A player who had bluffed little or never, but who suddenly changed his betting style and began to bluff at every opportunity, would get away with it for two or three hands at the most, but then the program would "suspect" him and BF would soar to nearly 1.

Making Draw Poker a Many Player Game

You will almost certainly be playing against your program using a VDU of some sort, or even a primitive LED for output. It is not really practical under these circumstances for more than one human being to take part in the game at any one time, but you can make the program into an interesting recreation by having it play all the hands apart from your own. The program must not cheat, otherwise it will always win, and it can make its probability calculations from each player's "seat" each time there is any action, either betting or drawing cards. Start each of the players off with the same amount of money, say $1 million, and play pot limit poker with $10 ante by the dealer. If you discover that the program is consistently too conservative for your liking, lower the 5% multiplicative factor. If the program plays too loosely, raise the 5%. If you wish to play in a poker game with players of varying styles, some loose some "tight," have different factors for different players. □

Bibliography

The following articles on Draw Poker should be considered more advanced reading for those interested in a more sophisticated approach.

Findler, Nicholas V., Klein, Heinz, et al., "Studies on Decision Making Using the Game of Poker," *Proceedings of IFIP Congress 1971*, Vol. 2.

Findler Nicholas V., "Studies in Machine Cognition Using the Game," *Comm. ACM*, Vol. 20, pp. 230-245 (1977).

Findler Nicholas V., "Computer Poker," *Scientific American*, Vol. 239, No. 1, July 1978, pp. 112-119.

"He died from an overdose of data..."

TRS·80 sensational software

creative computing software

Trucker and Streets of the City

CS-3207 TRS-80 Cassette (32K)
CS-3703 TRS-80 Disk (32K) $24.95

Trucker

This program simulates coast-to-coast trips by an independent trucker hauling various cargos. The user may haul oranges, freight or U.S. mail. All have different risks and rewards. Maximum profit comes from prudent risk-taking.

If all goes well, you can obey the speed limits, stop for eight hours of sleep each night and still meet the schedule. Bad weather, road construction or flat tires may put you behind schedule. You may try to increase your profit by skimping on sleep, driving fast or carrying an overweight load.

Other factors are choice of routes, truck payments, fuel, food, tolls and fines. The simulation is engrossing and informative.

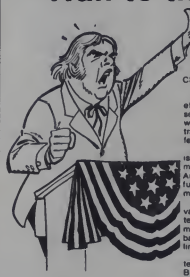
Streets of the City

This simulation is modeled on Grand Rapids, Michigan, a metropolitan area with a population of 550,000. The budgeting, cost and work standard bases are derived from actual experiences of the city over the past five years. The objective of the simulation is to complete a ten-year plan of street and transit improvements while retaining the support of a majority of the City Commission.

During your tenure, you must construct streets and Interstate highways, repair existing streets, and improve traffic safety. For the Transit Authority you have to upgrade and replace a delapidated bus fleet, increase ridership, reduce maintenance downtime and improve on-schedule performance.

Other factors to be considered are operating tax levies, construction bonding and labor negotiations. The simulation provides a substantial challenge and it is both educational and entertaining.

Hail to the Chief



by
Phillip W. Brashear
and
Richard G. Vance

CS-3701 TRS-80 Disk, 48K $24.95

Your object in this simulation is to be elected president. In your campaign you set your strategy and carry it out week by week. You may run TV or magazine ads, travel to different states, hold news conferences and participate in a debate.

You must take a position on ten campaign issues such as Energy Policy, Unemployment, Taxes, Mid-East Policy and Strategic Arms Limitations. You must manage your fund raising efforts to business, labor and mass direct mail solicitations.

The package includes four models of varying complexity, each can be used at ten levels of difficulty. The more complex models introduce the influences of incumbancy, campaign finance and spending limits.

Hail to the Chief has been used as a teaching aid in Political Science, Voting Behavior and Computer Science at the University level since 1976. It is a well proven package which includes a comprehensive manual.

3 Adventures

Disk CS-3516 $39.95
Requires 32K

Adventureland (by Scott Adams) You'll encounter weird animals, dwarfs and many other puzzles and perils as you wander through an enchanted world trying to rescue the 13 lost treasures. Can you rescue the Blue Ox from the quicksand? Or find your way out of the maze of pits? Happy Adventuring!

Pirate Adventure (by Scott Adams) Yo Ho Ho and a bottle of rum. You'll meet up with the pirate and his daffy bird along with many strange sights as you attempt to go from your London flat to Treasure Island. Can you recover Long John Silver's lost treasures? Happy sailing matey.

Mission Impossible Adventure (by Scott Adams). Good Morning. Your mission is to ... and so it starts. Will you be able to complete your mission in time? Or is the world's first automated nuclear reactor doomed? This one's well named: it's hard; there's no magic, but plenty of **suspense**.

Good Luck.

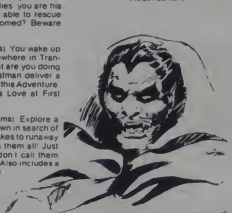
Voodoo Castle
The Count and Ghost Town

Disk CS-3517 $39.95
Requires 32K

Voodoo Castle (by Scott Adams) Count Cristo has had a fiendish curse put on him by his enemies. There he lies; you are his only hope ... will you be able to rescue him—or is he forever doomed? Beware the Voodoo man.

The Count (by Scott Adams) You wake up in a large brass bed somewhere in Transylvania. Who are you, what are you doing here, and why did the postman deliver a bottle of blood? You'll love this Adventure. In fact, you might say it's Love at First Byte.

Ghost Town (by Scott Adams) Explore a deserted western mining town in search of 13 treasures. From rattlesnakes to runaway horses, this Adventure has them all! Just remember pardner, they don't call them Ghost Towns for nothin'. (Also includes a new bonus scoring system.)



Original Adventure

Disk CS-3518 (48K) $19.95

This is the original adventure game complete with a colossal cave populated with nasty little dwarves, a giant clam, trools and much, much more. Includes the SAM76 language in which the game runs.

Adventures on Cassette

Five adventures are available separately on cassette. Each requires 16K and costs $14.95.

CS-3007 Adventureland
CS-3008 Pirate Adventure
CS-3009 Mission Impossible
CS-3010 Voodoo Castle
CS-3011 The Count

Order Today

To order any of these software packages, send payment plus $2.00 postage and handling per order to Creative Computing, Morris Plains, NJ 07950. Visa, MasterCard and American Express orders may be called in toll-free:

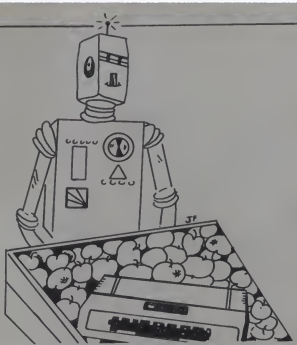
Order today at no risk. If you are not completely satisfied your money will be promptly and courteously refunded.

Creative Computing Software
Morris Plains, NJ 07950
Toll-free **800-631-8112**
in NJ 201-540-0445

creative computing software

Apple Cart

Chuck Carpenter



Correspondence is always welcome and a response will be made to those accompanied by a SASE. Send your letters to: Chuck Carpenter, 2226 Montclair Pl., Carrollton, TX 75006

Read any good disclaimers lately? Be sure to read some of the warranty disclaimers showing up in the documentation of software these days. You may decide not to buy just on the basis of what you read. My impression as I read them, is that the responsibility for use is the user's and nobody else's. If the software is useless as a result of incompetence or negligence or both, it's still the user's problem.

Sure, software suppliers want to protect themselves against people opening the drive door when a descriptor file is being written to the disk. And there are many of us who inadvertently bend, fold, staple, write on or otherwise multilate diskettes. But why not be reasonable with warranties; they sound as though the suppliers have no intention of supporting their products.

Why not have warranties that are positive? Let us know that the supplier will support the product. And, at the same time, let us know that the supplier will not be responsible for our blunders. After all, we are not a bunch of corporations! We are individuals supporting the desk-top computer and software industries.

RAMBLINGS

Recently, I was showing-off my computer by demonstrating games and Hi-Res graphics—most of them in Integer Basic. Several times when I tried to switch from one program to another, an OUT OF MEMORY error occurred. This happens when one program sets HIMEM or LOMEM or both and the next program doesn't reset these values. To the next program being loaded, it looks as though there is not enough memory to accept the program.

In the past, I have rebooted the system or tried to find the software switch addresses so I could reset the memory pointers. Suddenly, one day, it occured to me that there is an easier way. At least there is with DOS. (DOS is the Disk Operating System.) All you need to do is type FP if you're in Integer, or INT if you're in Applesoft. Doing this resets all the pointers to initial boot status. Then switch back to the language you want to use or just run the program. With DOS, the correct language will be selected anyway. Oh yes, be very careful to not type INIT when you mean INT. You might wipe out a disk. You can find out more about the commands to switch languages in The DOS Manual, pages 28 and 29. Anyone have a good way to do it with a tape system?

Master Disk 3.3

DOS 3.3 includes a system disk with a number of utilities, demo programs and the programs required to boot the system. Because several system combinations are possible, all booting and language requirements are included on the Master System disk. Depending on your system, and whether you are using the language card, Applesoft or Integer Basic is loaded into the card. The boot programs called HELLO and APPLESOFT include tests for the presence of the language card. HELLO is an Applesoft program. APPLESOFT is the same program written in Integer Basic. If your system has Integer in ROM, Applesoft is loaded into the language card. Your Integer Apple tries to run the HELLO program, finds that it is in Applesoft, loads the APPLESOFT program and runs it. Since the Applesoft program is really in Integer Basic, the program is run like any other program. The reverse occurs if you have an Apple II Plus with Applesoft in ROM.

You do not need all the programs on the master disk to boot your system. You can save a lot of space if you include only those programs needed by your system. If you have an Apple II, you need the Integer HELLO program (called APPLESOFT) and the FPBASIC program. The Applesoft HELLO program and INTBASIC programs are required for an Apple II Plus. To customize your working disks, try this:

First, initialize a diskette using the procedure from your DOS Manual. Notice how much faster you can INIT a diskette with DOS 3.3 than you can with 3.2.

Next, use the FID utility to transfer—from the master disk—the APPLESOFT program, and the FPBASIC program to the INITed diskette. Follow the procedure in The DOS Manual.

Now, before you do anything else, rename APPLESOFT, HELLO. Make a note of this change on the label. This disk will not boot on an Apple II Plus.

Be sure you make a copy of the master system disk, and use it, before you start this procedure. (The DOS 3.3 COPY program is faster than 3.2 too.)

At this point, you have a disk that will boot on an Apple II and load Applesoft into the language card RAM. The Integer Basic HELLO program looks for the language card, and if it's there, loads the FPBASIC program (Applesoft.) For those systems with only Applesoft in ROM and no Integer Basic card (standard Apple II Plus), a different set of programs is needed. In fact, if all that is available is Applesoft, use whatever INIT program you choose. There is no need to have programs that will look for the language card.

Another feature I added to my working copy of the system master is Double DOS. (Not the one we just made, the one with all the utilities.) With this program in memory you can switch easily from one DOS system to the other. Double DOS uses about 7K of memory, but it is very handy when you want to work interchangeably with the two systems. I modified the HELLO program to run Double DOS after Applesoft

At last! You can VIDEOTAPE apple color graphics

THE *ADWAR* APPLE PROC. MOD.

Modifies nonstandard Apple color sync signals to fall within NTSC videotape recorder tolerances. Record, edit, duplicate without loss of color.

Add colorful graphics and illustrated titles to your videotapes. Easy to install in slot #7 of Apple computer.

ADWAR APPLE PROC MOD $300

ADWAR VIDEO 100 Fifth Ave., New York 10011
(212) 691-0976 • Telex 420801

CIRCLE 104 ON READER SERVICE CARD

Reliable Business Bookkeeping Software

ORDER ENTRY

GENERAL LEDGER

COMPUMAX

CIRCLE 147 ON READER SERVICE CARD

Computer Station

12 Crossroads Plaza
Granite City, IL.62040
(618) 452-1860

COMPUTER STATION proudly offers a high-speed binary video digitizer for the Apple II called the **DITHERTIZER II**. The peripheral board uses a video camera with external sync to load the hi-res page of the Apple with any image the camera can capture. The **DITHERTIZER II** is a frame grabber, DMA type digitizer requiring only 1/4th of a second to capture a binary image. Software supplied with the board enables building dithered images and capturing image intensity contours. Intensity and contrast are user controllable via the game paddles. Matrix size for dithering changable with one keystroke. Requires video camera. With external sync; recommended model, Sanyo VC1610X.

DITHERTIZER II, $300; B/W SANYO VIDEO CAMERA, $410; PACKAGE OF DITHERTIZER II AND CAMERA, $650.

GRAPHIC DUMPS: COMPUTER STATION offers the highest degree of human engineering on the market for hard copy graphics from the hi-res pages of the Apple. The following machine language dump routines are available for BASIC:

ID8440G/445G*	**$44.95**
ID8460G*	**44.95**
ANADEX 9501	**44.95**
NEC 8PINWRITER 5510	**44.95**
NEC 8PINWRITER 5520	**44.95**

*** Also available for use with Pascal, $44.95.**

GRAPHICWRITER: Hard copy of character sets found in DOS Tool Kit for use with Applewriter or print statements in your own programs. Requires DOS 3.3, DOS Tool Kit, one of graphic printers below:

Silentype	**$34.95**
ID8440G/445G	**34.95**
ID8460G	**34.95**

VISILIST: Get hard copy of the FORMULAS used in VISICALC models. Prints grid location, contents (formulas or labels), and global parameters. Handy utility for all VISICALC users. **$24.95**

PROGRAMMER'S GUIDE TO THE APPLE II: Thick reference card (40 page booklet). **$4.95**

PROGRAMMERS HANDBOOK TO THE APPLE II: $29.95

Send or call for free catalog.

Apple II is a registered trademark of Apple Computer, Inc. VISICALC is a registered trademark of Personal Software, Inc. DITHERTIZER II is a registered trademark of Computer Stations, Inc.

CIRCLE 149 ON READER SERVICE CARD

Apple Cart, continued...

is loaded. Line 310 can be changed to read:

310 CALL -936 : VTAB 12: HTAB 10 : PRINT "RUNNING DOUBLE DOS"

Then add this line:

320 PRINT "*RUN DOUBLE DOS"

The asterisk means to type a CONTROL D as the first character inside the quotes. Now save the revised program by typing:

SAVE HELLO

If you don't have a copy of Double DOS, you can get one over the phone from the Telephone Software Exchange (213) 329-3715. Of course, you have to have a modem to do this, and a plastic money account number which to charge it to.

Another way to switch from one type of DOS to the other is to modify the hardware. Some enterprising souls have soldered one set of ROMs to the other. The pins to connect the supply voltage were lifted and left unsoldered. These pins were then connected to a DPDT switch. Lots of things can happen when you do this, so I don't recommend it. That's why I'm telling you about it.

Measuring Remaining Memory

When using Applesoft, all you need to do to find remaining memory is type PRINT FRE(0). However, if you have more than 32K of memory left, you will get a negative number. To convert the negative number to a positive number, add 65536 to it. The maximum amount of memory available in a 48K machine is 65536 bytes. As an immediate mode command, it would look like this:

PRINT 65536+FRE(0)

Should the amount of remaining memory be less than 32K however, you will get a larger positive number; something greater than 65536. To avoid the problem try this sequence.

```
X = 65536+FRE(0)
IF X > 65536 THEN X = X - 65536
PRINT X
```

When you need to know the remaining RAM memory, use a subroutine like this in your program.

Programming Hi-Res Graphics

If you're just starting to write Hi-Res programs on your Apple II Plus, you may run into a limited program size problem. Floyd Goldstein from Bellmore, NY did and wrote to me about it. I checked it out and sure enough, for those of you using Applesoft, there can be a limited memory problem. Here's some historical background that explains the problem.

In the beginning, the Apple II was available only with Integer Basic. Integer Basic, at least Apple Integer Basic, was written mostly to be a game programming language. And, graphics capability was included to make any game more dramatic and interesting. Integer Basic does not have many of the features included in Applesoft, but it is very fast. But, these are not the features that cause the problem. An Integer Basic program is stored differently in memory from the way an Applesoft Basic program is stored. The program is stored in memory starting from HIMEM, and grows in size toward LOMEM. Variables used in the program are stored starting at LOMEM and expanding upward. If you construct a memory map similar to the one included in the December '80 column, you can visualize the results better. Pages for Hi-Res graphics are located between high and low memory locations. For Integer Basic, this works well. Most of available memory is from the high end down. Applesoft stores programs from low memory up. If you use page one, there is about 4K of memory for a program. If you use only page two (HGR2) then about 12K of memory is available.

Machine language can be used to solve part of the problem. Write short Applesoft programs that call machine language stored in high memory locations. This assumes you can program in machine language. Another way is to buy the Integer Basic ROM card. Then you can write graphics programs the way the Apple II was designed to be used. The expense of the Integer card may make the latter approach unpopular. Having the Integer card though, makes it possible to do anything the Apple was designed to do.

Lo-Res Block Letters

Some time ago, I needed to make a series of slides using lo-res graphics. Mostly, the slides were words in block letters. Because I was presenting the Apple II, the words "Apple II" were on one of the slides. Listing 1 is a segment of the program used. Applesoft is the language and allowed the use of READ . . . DATA commands. First, quadrille paper was used to represent the 40 x 40 screen. Then, each letter was blocked out on this matrix. Next, each block was given a matrix location according to Apple screen conventions. The first number of each pair is the horizontal position, the second number is the vertical position. DATA statements were written to include the number pairs for each letter.

```
2000  HOME : GR : FOR I = 1 TO 99
2010  LET C =  INT ( RND (1) * 15) + 1
2020  IF C <  > 1 AND C <  > 2 AND C <  > 8 AND C <  > 9 AND C <  > 12 AND C <  > 13 THEN  GOTO 2010
2030  COLOR= C
2040  READ X,Y: PLOT X,Y
2050  NEXT I
2060  DATA  5,3,4,4,3,5,3,6,3,7,3,8,3,9,4,4,7,5,7,6,7,7,7,8,7,9,4,7,5,7,6,7
2070  DATA  10,3,10,4,10,5,10,6,10,7,10,8,10,9,11,3,12,3,13,3,14,4,14,5,14,6,13,7,12,7,11,7
2080  DATA  17,3,17,4,17,5,17,6,17,7,17,8,17,9,18,3,19,3,20,3,21,4,21,5,21,6,20,7,19,7,18,7
2090  DATA  24,3,24,4,24,5,24,6,24,7,24,8,24,9,25,9,26,9,27,9,28,9
2100  DATA  31,3,31,4,31,5,31,6,31,7,31,8,31,9,32,9,33,9,34,9,35,9,32,3,33,3,34,4,35,4,32,6,33,6,34,6
2110  DATA  16,12,17,12,18,12,18,13,18,14,18,15,18,16,18,17,18,18,17,18,16,18
2120  DATA  23,12,22,12,21,12,21,13,21,14,21,15,21,16,21,17,21,18,22,18,23,18
2130  RESTORE
2140  HOME : VTAB 23: HTAB 30: PRINT "SLIDE 1": GET A$
2150  GR : TEXT : HOME
```

Listing 1. An Applesoft program using READ and DATA statements to store and reproduce lo-res graphics characters.

MISSILE DEFENSE

In this arcade-quality action game you command the Nation's missile defense center to defend against a foreign missile attack. As missiles drop from the sky, you must shoot them while trying to protect your six cities and three missile bases. An automatically esculated skill level ensures that the better you get the tougher missile defense gets!

- Fast machine language. Hi-Res animation and sound!
- Rapid fire capability - mark and shoot at many targets simultaneously!
- Works great with keyboard only, paddles or joystick!
- Seperate control over all three missile bases!
- Bonus cities awarded for high scoring!

WARNING: This game has been known to cause addiction and should be used with extreme caution!!!

Missile Defense runs on any 48K Apple II or II Plus, DOS 3.2 or 3.3. Available now for $29.95 on disk from your local computer store or you may order directly from:

ON-LINE systems

36575 MUDGE RANCH ROAD
COARSEGOLD, CA 93614
209-683-6858

ORDERS MAY BE CHECK VISA MASTERCHARGE OR C O D

CIRCLE 246 ON READER SERVICE CARD

MicroStand™

At Your Local Dealer

Organize your Apple II[1] or TRS-80[2] Model I hardware for convenience, protection, and that professional appearance. MicroStand will accomodate your Disc Drive, Stringy Floppy,[2] Cassette Player or combination of either. Professionally constructed, color and texture coordinated, it is a piece of quality hardware which will enhance your home or office microcomputing system. Apple users will enjoy the easy slide out access for internal adjustments.

Add $5.00 for handling and shipping **$34.95**

VISA

MicroStand
P.O. Box 96
Tolovana Park, OR 97145
1 (503) 738-5629

1. TM of Apple Computers Inc 2. TM of Tandy Corp 3. TM of Exatron

CIRCLE 243 ON READER SERVICE CARD

GALAXY SPACE WAR I

Galaxy Space War I* (WAR1) is a game of strategy in which the player has complete control of his space fleet's tactical maneuvers. Each fleet battles its way toward the opponents galaxy in an attempt to destroy it and win the war. WAR1 simulates the actual environment encountered in a space war between two galaxies. Optimum use is made of Apple's high resolution graphics (HIRES) and colors in displaying the twinkling stars universe, the colored ships of each fleet, long range sensors colored illuminations, and the alternating blinking colors used in battles between ships. Complementing HIRES are the sounds of war produced by Apple's speaker.

WAR1 is played between Apple and a player or between two players. You may play with total knowledge of each others fleet or only ships sensor knowledge of the opponents fleet. Each player builds his starting fleet and adds to it during the game. This building process consists of creating the size and shape of each ship, positioning it, and then allocating the total amount of energy for each ship.

During a player's turn he may dynamically allocate his ships total energy between his screen/detection and attack/move partitions. The percentage of the total energy allocated to each partition determines its characteristics. The screen/detection partition determines how much energy is in a ship's screens and the detection sector range of its short range sensors. The attack/move determines the amount of energy the ship can attack with, its attack sector range, and the number of sectors it can move in normal or hyperspace.

When an enemy ship is detected by short range sensors, it is displayed on the universe and a text enemy report appears. The report identifies the ship, its position, amount of energy in its screens, probable attack and total energy, a calculated detection/attack/move range, and size of the ship. Also shown is the number of days since you last knew these parameters about the ship. When a ship's long range sensor probes indicate the existence of an enemy presence at a sector in space, this sector is illuminated on the universe.

An enemy ship is attacked and destroyed with attack energy. If your attack energy breaks through his screens, then his attack energy is reduced by two units of energy for every unit you attack with. A text battle report is output after each attack. The program maintains your ship's data and the latest known data about each enemy ship. You may show either data in text reports or display the last known enemy positions on the universe. You can also get battle predictions between opposing ships. The text output calculates the amount of energy required to destroy each ship for different energy allocations.

APPLE® II, 48K, APPLESOFT ROM CARD, DISK II DOS 3.2
WAR1 DISK & MANUAL ...$39.95
(CA residents add 6% sales tax)
Write or call for more information

GALAXY
DEPT. CC5
P.O. BOX 22072
SAN DIEGO, CA 92122
(714) 452-1072

Apple Cart, continued...

In the program, line 2000 starts the sequence by clearing the screen, turning on the graphics mode, and beginning the plotting loop. Line 2010 generates a random number equal to the number of each possible color. The colors desired are the Apple colors, so line 2020 allows only those six colors. Line 2030 sets the color equal to the number selected, and line 2040 READs the data pairs from the DATA statements and PLOTs them on the screen. Beyond the DATA statements, one line RESTOREs the DATA pointer, another identifies the slide and holds it on the screen until a key is pressed. When desired, the slide is replaced with another after clearing the screen of graphics and text (line 2130). Since this segment could be a subroutine, a RETURN statement would be appropriate at this point.

READERS' INPUT

A billboard routine was included in the January '81 column. The program displayed a message in scrolling billboard fashion on the screen. Brian Winkel from Albion College in Albion, MI sent along his version shown in Listing 2. Brian feels his version is more interesting and useful since it will scroll your message indefinitely. One obvious modification, according to Brian, would be to use "many strings, one after the other, and scan a story across."

Rosa Pascal Sez

In response to a letter from Max Nareff from San Francisco, Ron DeGroat has come to my rescue once again. Max needed a Pascal program that would randomly generate all 26 alpha characters without repetition. The program in Listing 3 is Ron's reply. I'm not going to explain it, and will leave its use of those of you who are Pascal programmers. Max wrote back and said it worked, and that was good enough for me.

Yes/No Answers

One of the routines included in the January '81 column showed how to include a uniform question answering routine in your programs. Robin Ault from Newtonville, MA, has sent along additional information about this routine. It appears that a conflict occurs with the GET command and DOS commands. Robin's letter explains part of the problem. She says, "In the three-line subroutine for getting yes/no answers, I think an extra PRINT statement would help matters:

```
100 PRINT Q$ "(Y/N)"; : GET A$ :
PRINT A$ : IF A$ = ...etc.
```

Or, the PRINT A$ could be just PRINT. Reasons: (1) as the routine stands, the error message in line 120 will be printed starting on the same line as the (Y/N) bit, right after it. With my added PRINT A$, it

```
2  REM  SOURCE: CREATIVE COMPUTING.  JANUARY 1981 PAGE 174.
5  REM  WRITTEN BY BOB SAWDER-CEDERLOF
6  REM  SOURCE SUPPLIED IDEA ONLY.
7  REM  TOTALLY MODIFIED AND WORKED UP BY BRIAN J. WINKEL, 7 JANUARY 1981
8 LG = 1: REM  DELAY BETWEEN LETTERS
9 B = 0: REM  INDICATOR SET LATER AS 1 IF MESSAGE IS > 40 LETTERS ELSE B = 0.
10 Q = - 16336: TEXT : HOME : REM  Q IS SPEAKER
15  REM  LINES 61 AND 146 ARE RANDOM CLICKS TO SIMULATE SOUND OF TICKER TAPE.
20  REM  PRINTING BORDERS
30  FOR J = 1 TO 2: VTAB J + 4 + 2: FOR I = 1 TO 40: PRINT "*";: NEXT I: PRINT : NEXT
40  REM  MESSAGE TO TICKER TAPE AS STRING B$
50 B$ = "TICKER TAPE....WINKEL AD AGENCY...THE BEST IN TOWN...YOUR MESSAGE IN LIGHT AND
    SOUND... SEE LINE 50...STRING B$...FOR YOUR VERY OWN MESSAGE!!...$50 PER LINE... CA
    LL 402-4350...IN NEW JERSY CALL COLLECT"
51  REM  LINES 52-55 PREPARING MESSAGE IN TWO CASES: LENGTH > OR <= 40.
52  IF  LEN (B$) > 40 THEN B = 1
53  IF  LEN (B$) < 40 THEN  GOTO 55
54 B$ = B$ + ".....": GOTO 60
55  FOR J = 1 TO 40 -  LEN (B$):B$ = B$ + ".": NEXT J
59  REM  LINES 59-62 PRINTING MESSAGE STARTING WITH MESSAGES ENTERING FROM RIGHT SIDE OF
    SCREEN.
60  FOR I = 1 TO 40: VTAB 8: HTAB 41 - I: PRINT  LEFT$ (B$,I);" "; FOR K = 1 TO LG: NEXT
    K
61  FOR Z = I TO  INT (10 *  RND (1) + .5):P = P +  PEEK (0): FOR W = I TO 30: NEXT W: NEXT
    Z
62  NEXT I
80  REM  LINES 80-160 PRINT MESSAGE AFTER SCREEN LINE IS FILLED ONCE.
90  FOR I = 1 TO  LEN (B$)
100  VTAB 8
105 C$ =  MID$ (B$,I, LEN (B$) - I) +  MID$ (B$,1,I - 1)
145  PRINT  LEFT$ (C$,40)
146  FOR Z = 1 TO  INT (10 *  RND (1) + .5) * P = P +  PEEK (0): FOR W = I TO 30: NEXT W
    : NEXT Z
150  FOR K = I TO LG: NEXT K
160  NEXT I
170  GOTO 90
```

Listing 2. A billboard program to continuously scroll a message. This routine is complete with sound.

```
PROGRAM RANDDMALFA;      (***************)
                         (*  WRITTEN BY *)
USES APPLESTUFF;         (* RON DEGROAT *)
                         (* 15-DEC-1980 *)
VAR ALFA:STRING;         (***************)
    LETTER:STRING[1];
BEGIN
   LETTER:=' '; (*NULL STRINGS SHOULD*)
   ALFA:=' ';   (*USUALLY BE AVOIDED *)

   WHILE (LENGTH(ALFA) <> 26) DO
      BEGIN
         LETTER[1]:=CHR((RANDOM MOD 26)+65);
         IF (POS(LETTER,ALFA) =0)
            THEN ALFA:=CONCAT(ALFA,LETTER);
      END;
   DELETE(ALFA,1,1);  (*DELETE LEADING BLANK*)
   WRITELN(ALFA);
END.
```

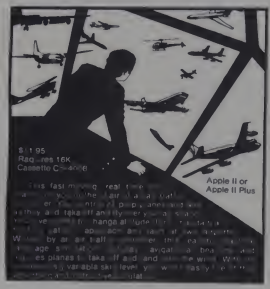
Listing 3. Pascal program to generate the 26 alpha characters randomly without repetition.

Apple II

sensational software

creative computing software

Air Traffic Controller



$11.95
Requires 16K
Cassette CS-4008

Apple II or Apple II Plus

This fast moving real time game [illegible] or [illegible] and [illegible] as the aircraft speed up, slow down, change altitude, [illegible] and [illegible] as aircraft are sent to their destinations. With [illegible] by air traffic controllers, the [illegible] image simulates [illegible] aircraft using [illegible] as planes [illegible] take off and [illegible] the world. With [illegible] 10 variable skill levels you will [illegible] and [illegible] [illegible].

Action Games

Cassette CS-4011 $11.95 3 Games

Cycle Jump Try to jump over rows of cars, buses and trucks

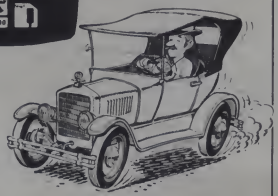
Mine Rover Use your rover to cross a mine field with moving mines

Road Machine Drive over a curving mountain road as fast as possible. Eight skill levels

Milestones

Cassette CS-4015 $11.95 Requires 48K Applesoft or Apple II Plus

The object of Milestones is to complete a 700-mile auto trip before your opponent the computer. You must deal with hazards of the roads: stop lights, flat tires, speed limits, accidents and gas shortages. Spectacular high resolution color graphics.



Bumping Games

Cassette CS-4020 $11.95 3 Programs

Obstacle Course This multi-level course includes hurdles, ladders, tires and penalty areas. Different every time

Hustle The score keeps building but the escape routes dwindle. Can you reach the blocks before they disappear?

Bumper Blocks An absorbing game of evasion and collision. Five skill levels

Action & Bumping Games

Disk CS-4016 $24.95
Requires 32K Applesoft or Apple II Plus

This disk contains all six games from cassettes CS-4011 and CS-4020

Milestones

Disk CS-4015 $19.95
Requires 48K Apple II or Apple II Plus

In addition to the game each [illegible] the complete playing instructions

Advanced Air Traffic Controller

Disk CS-4017 $19.95
Requires 16K Apple or Apple II Plus

This price is an advanced version of Air Traffic Controller (Cassette CS-4008) offering additional features and challenge

Order Today

To order any of these software packages send payment plus $2.00 postage and handling per order to Creative Computing, Morris Plains, NJ 07950. Visa, MasterCard and American Express orders may be called in toll free

Order today at no risk. If you are not completely satisfied your money will be promptly and courteously refunded.

Creative Computing Software
Morris Plains, NJ 07950
Toll-free: 800-631-8112
In NJ: 201-540-0445

creative computing software

will start more normally, on a new line and, also, the user will be able to see what was just typed; (2) the sample application you gave, with a subroutine call from line 1910, may not work because the PRINT D$ "CATALOG" does not occur after a carriage return. So, unless the D$ is something like CHR$(13)+CHR$(4), DOS will not pick up the CATALOG command. (Note that CHR$(13) is a carriage return and CHR$(4) is a CONTROL D...CC.)

COMMUNICATIONS

Data Capture 4.0 from Southeastern Software enables the user with a Hayes Modem, to generate, send, receive and capture data from any compatible time-share system. I'm not sure what isn't compatible. It has worked with every time-share system to which I have access. And that inlcudes mainframes and bulletin boards.

Data Capture has been around for a while at various lower revision levels. I have 3.0 but didn't use it much; it was, in my opinion too awkward to use. Not so with version 4.0! All functions are controlled from a menu. The menu uses single character commands for each function. When the menu is displayed on the screen, pressing a related key will activate one of the 13 available choices. The T or Toggle function includes seven more options. Operation is controlled with the toggle choices and includes drive selection, baud rate, capture on/off, duplex half/full, local carrier on/off, special characters on/off, and transmit on/off.

Documentation

Operating instructions are included in 24 pages of documentation. There is no binder for the pages, but once you learn how to use the software they will hardly be needed. Operation is very friendly and usually only access to the menu is needed. You can file the instructions away in a folder and retrieve them when required.

Page one begins by telling you to make backup copies. Configuring the diskette for your system is described here and so are the special notes found throughout the documentation. Two and a half pages then describe in detail how to configure the diskettes to your system. Use of the systems is described in the remainder of the documentation. All the menu functions are discussed and many examples of what you should see or do are given. Human factors and friendliness—features I am tough about—are in the very good category.

Operation

Once you have the configuration completed, operation is simple. Just switch to the menu and select a function. You can compose text, do simple text editing, send the text, copy or capture text, save the text to disk, and list the text. Other functions include answering the phone, hanging up the phone, merging text, and printing text. More things than I've had any occasion to do. There is also a provision for entering and automatically dialing phone numbers. Even though the software is designed to work automatically with the Hayes Modem, provisions are made for manual operation with acoustic modems. Additionally, the software supports lower case only with an adapter. Without an adapter, only capital letters are possible.

Conclusions

I've used, or tried to use, previous versions of Data Capture. I have also used several other communications programs. Data Capture 4.0 is the easiest to use and most flexible so far. You can get Data Capture 4.0 for $65 from Southeastern Software, 6414 Derbyshire Dr., New Orleans, LA 70126. Phone (504) 246-7937/8438. If you want to have real lower case too, the Paymar Lower Case Adapter is available for $64.95.

GAME PADDLE I/O EXPANDER

CJM Enterprises is manufacturing an expander/extender for the Apple paddle socket. They call it the Microsystem and it includes an Applexpander, Microstick (joystick/game paddle), and an AC Control box. (See Figure 1.) You may have seen their ads in *Creative Computing* over the past few months. By itself, the CJM Applexpander is an extension of the game paddle socket with a lot of plusses. Here are the features:

16 pin extension cable to bring the socket connections outside the Apple II case.

Rugged sockets to accept the popular "Jones" style plugs. These won't wear out as less durable plugs do.

Electronically buffered connections to the circuits. Keeps things from being connected directly to your Apple and causing damage.

External speaker connections and a volume control. Note that this feature requires cutting wires in your Apple.

Once the Applexpander is plugged in, there is no longer any need to use the internal socket. Additional wear on the socket is eliminated. IC sockets are not designed for lots of insertions and removals, so one potential source of trouble is removed.

Microstick

Essentially, the Microstick is two game paddles in one package. Two rugged pushbuttons are included on the chassis too. The Applexpander will accept two of these, giving four game paddles at one time. Don't forget that you can still only have three switch inputs; that's all there are.

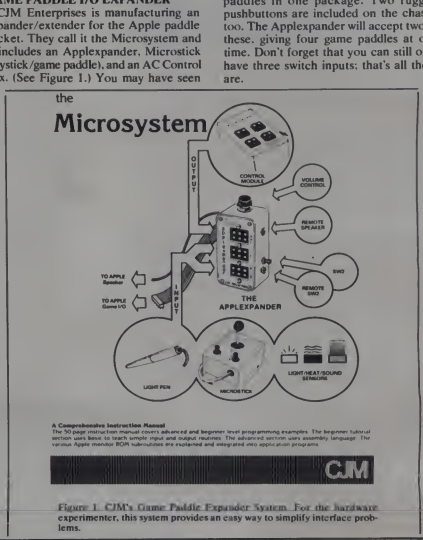


Figure 1. CJM's Game Paddle Expander System. For the hardware experimenter, this system provides an easy way to simplify interface problems.

A booklet is included with the system describing its uses and things you can do. There are examples of software showing how to use the inputs and outputs. Software examples are in Basic and machine language. There were several typos and exclusions in the booklet I received, some of which could mislead the less experienced user. These should be corrected by the time you read this.

If you're inclined to experiment with simple hardware ideas, this system can make the job easier. All the required interfacing and buffering is done. I didn't get the AC Control box so I can't tell you about it. The parts I did get are rugged and well packaged. The use of rugged parts is necessary to prevent wear and broken pins. You can get the system from CJM Industries, Inc., P.O. Box 2367, Reston, VA 22090. Phone (703) 620-2444. Microsystem is available as individual parts or as a complete system. Prices range from $74.95 for the Applexpander, $69.95 for the Microstick, and $109.95 for the AC Control box.to 169.95 for System I. System I is one each Applexpander, Microstick, paddle adapter kit, software (graphics kit and demo), and documentation. There are other system combinations to $399.95. CJM also lists several other items on the order form, including some devices to connect to the AC Control box.

PASCAL MANUALS

My new Pascal manuals came in the mail recently, and they were worth the wait. I sent in the card that came with my language system over a year ago. With the card, a new owner was to get the new manual(s) free when published. The single preliminary reference manual grew into two manuals. One is called the Language Reference Manual, and the other is called the Operating System Reference Manual. I'm not a serious Pascal programmer but I find them useful for anything I need to know about the system. The new Apple Fortran system also requires the user to have the information in the Operating System Reference Manual. That seems to be the reason for two manuals. Fortran comes with only the Fortran Language Reference Manual. If you bought the Language System, and sent in the card, you should have received the manuals by now.

APPLE INFORMATION

Subscribe to the International Apple Corps magazine, *Apple Core*. Lots of Apple info for $10 a year, quarterly. P.O. Box 2227, Seattle, WA 98111. □

Why would anyone spend $59.95 for a joystick?

Super Joystick

Star Wars. Played with paddles, it's difficult at best and frustrating at worst. But with a joystick it becomes an entirely new experience. It's still challenging. It's also fun. And very addictive.

Have you ever used a drawing program in which one paddle controls the horizontal movement of the "brush" and the other paddle the vertical? It's slow, tedious work. But with a joystick, drawing is an absolute joy.

Exceptional Precision

The Apple high-resolution screen is divided into a matrix of 160 by 280 pixels. To do precise work on this screen, you need a precise device. Most potentiometers used in paddle controls are not quite linear. If you rotate a paddle control at a constant speed, you'll notice that the cursor speeds up slightly at the beginning and end of the paddle rotation.

The Super Joystick has a pure resistive circuit which is absolutely linear within one tenth of one percent. In other words it would give you precise control over an image of 1000 by 1000 pixels, were such resolution available. Thus it is suitable for high precision professional applications as well as educational and hobbyist ones.

Matched to your application

The Super Joystick also has two external trim adjustments, one for each direction. This allows you to perfectly match the unit to your application and computer. Say you want to work in a square area instead of the rectangular screen. Just reduce the horizontal size with the trim control.

How many times have you played Space Invader and had your thumb ache for hours from the repeated button pressing? This won't happen with the Super Joystick. It's two pushbuttons are big. Moreover, they use massive contact surfaces with a life of well over 1,000,000 contacts. A few games of Super Invader using these big buttons will justify the purchase of the Super Joystick.

The Super Joystick is self-centering in both directions. That means when you take your hand off it, the control will return to the center. However, if you want it to stay where you leave it, self-centering may be easily disabled.

The Super Joystick plugs right into the paddle control socket and doesn't require an I/O slot.

High-quality construction

The sturdy metal case of the Super Joystick matches that of the Apple computer. Every component used is the very highest quality available. The Super Joystick even uses a full 16-conductor ribbon cable so you can add a second joystick if you wish. The first Super Joystick replaces Paddles 0 and 1. You may not realize it, but the Apple can support four paddle controls. A second Super Joystick would replace Paddles 2 and 3.

By removing two springs, self-centering can be defeated.

We invite your comparison of the Super Joystick with any other unit available. Order it and use it for 30 days. If you're not completely satisfied, return it for a prompt and courteous refund plus your return postage. You can't lose.

The Super Joystick consists of a self-centering, linear joystick, two trim controls, and two pushbuttons mounted in an attractive case. It comes complete with an instruction booklet and 90-day limited warranty. Cost is $59.95.

Unique paddle extension unit

If you anticipate changing between the Super Joystick and paddle controls, you'll want our paddle extension unit. One end plugs into the paddle input in the computer and the other has a heavy-duty socket that mounts on the outside of the computer. It can mount on the back or side, whichever you prefer. Price of this extension unit is just $9.95.

To order the Super Joystick send $59.95 plus $2.00 postage and handling (NJ residents add $3.00 sales tax) to our address below. For the extension unit, send an additional $9.95.

Experience the joys of using the world's finest joystick. Order your Super Joystick at no obligation today.

Peripherals Plus

39 East Hanover Ave.
Morris Plains, NJ 07950
Toll-free 800-631-8112
(In NJ 201-540-0445)

CIRCLE 236 ON READER SERVICE CARD

Personal Electronic Transactions

I am happy to hear from you, and encourage your correspondence. I will try to acknowledge all correspondence, and a SASE makes things easier for both of us. Please send your letters to "Personal Electronic Transactions" c/o PO Box 354, Palo Alto, CA 94301.

A Speedy Story

Robert Maas, an Artificial Intelligence hacker I know, relates the following story:

"Several years ago, I became interested in the problem of how to cut a checkerboard into two identical halves. If the checkerboard has an odd number of squares on its edge, the center square is first removed. The problem had been solved for the 6 x 6 board and I wrote several programs to solve larger boards, in particular the 10 x 10 board. This was done in machine language on the IBM 1620 (a machine common in the early 1960s) and took about 200 hours of machine time to solve.

Recently, I obtained a personal 6502 system and for the fun of it, wrote my checkerboard problem for this machine. The 6502 solved the 10 x 10 board in less than an hour."

```
10 REM SHORT DEMO
20 PRINT "";
30 GOSUB 3100
40 CX=40:CY=25
50 FOR A=S TO 30 STEP .19
60 R=A
70 X=R*COS(A)+CX
80 Y=R*SIN(A)+CY
90 GOSUB 3000
100 NEXT
110 CX=CX-2:GOTO 50
3000 REM PLOT BY THOMAS SKIBO
3010 REM X,Y ARE CO-ORDINATES
3020 LL=INT(X/TW)+INT(Y/TW)*TF:CH=PEEK(LL+SC)
3030 IF LL<TZ OR LL>T9 THEN RETURN
3040 FORN=TZTOTH:IF CH=PK%(N)THEN 3060
3050 NEXT:N=TZ
3060 N=(TA-((X AND TA)=TA))*(TA-((Y AND TA)=TA)*TT)OR N
3070 POKE LL+SC,PK%(N):RETURN
3100 REM INITIALIZATION
3110 DIM PK%(15):TA=1:TW=2:TT=3:TF=40:SC=32768:TZ=0:TH=15:T9=999
3120 FOR X=0TO15:READ PK%(X):NEXT:RETURN
3130 REM POKE DATA
3140 DATA 32,126,124,226,123,97,255,236,103,127,225,251,98,252,254,160
```

Figure 2.

The 1620 costs about $250,000. If you measure performance in terms of cost-per-instruction, the cost ratio is 312 to one and the speed ratio is 200 to one. This gives a relative performance of over 60,000 to one!

Since the improvements in computers have been exponential in the last 30 years, these figures suggested the following prophetic program:

```
10 REM PERFORMANCE PROPHET
20 C1=250000:C2=800
30 S1=200
40 P=C1/C2*S1
50 PL=LOG(P)/25
60 INPUT"YEARS:";Y
70 PRINT"PERFORMANCE:"EXP(Y*PL)
80 PRINT"COST - SPEED:"EXP(Y*PL/2)
90 GOTO 60
```

Computer pundits maintain that performance and memory improve by a factor of two every two years. My personal figures (taken from many sources) indicate a factor of about 2.5, and this program says 2.42. Since cost and speed are about equal parts of this equation, I chose the square root of the performance as a reasonable guess. The results? Supposing that 1977, the introduction of the PET, is year zero, with an initial cost of $4800 and a speed of 1 Mhz, I get the results shown in Figure 1.

Year	Cost	Speed	Performance
1977	800	1.0	1.0
1981	330	2.4	5.8
1985	137	5.9	34.3
1990	45	17.7	312
2001	4	200	40200

Note that the VIC costs $300. Keep these numbers in mind, and see if they make sense in 1990. If you run this to extremes in 40 years, the processor will cost twelve cents and run 7000 times faster—think of the breakfast food boxes in the supermarket which not only speak to you but can also engage you in serious philosophical conversation! The term "cereal bus" takes on a very different meaning.

A Compact Hi-res Plot Routine

If you have attempted the PET's "Hi-Res" plot mode of 80 x 50 characters taken from the shifted . ; ? ! and " graphic characters and their reverse field counter-

PET	RC-80		
PA0	D0	29	
PA1	D1	21	
PA2	D2	31	Data to RC-80
PA3	D3	25	
PA4	D4	17	
PA5	D5	27	
PA6	D6	23	Status from RC-80
PA7	D7	19	
CB2	C1	11	Clock Data in (Control 1)

Figure 3.

parts, you know that many bulky and clumsy solutions exist for this problem. Tom Skibo of Saint Petersburg, FL sent me a version which is quite compact and runs reasonably rapidly. Figure 2 is his plot program (after a few changes for speed and a more dramatic demonstration plot.)

The most important speedup trick was to make all constants variables as seen in Line 3110.

Line 20 prints the clear screen character which won't appear on my printer.

S1 to S7 -	Off	Addresses which don't matter
S8	On	Set I/O Chip Mode On.
S9, S10	Don't Care	
S11	Off	Disable C4 line.
S12	Off	Parallel Port Mode Set.
S13	Off	Address Decoding Off.
S14	Off	Disable C2 line.
S15	Don't Care	
J1	No Connect	
J2	No Connect	
J3	Connect	
J4	Position 3	
J5	Position 3	
J6	Connect	
J7	No Connect	
J8	No Connect	
J9	No Connect	
J10	Connect	
+5 option	No	
C4, C5 to Cable -	No	
RST		

Figure 4.

Control The World

Though triacs are a good way to control some lighting applications, you don't want to have extension cords running all around the house to have your PET be in charge of the house lights. BSR offers a system, the X-10, which consists of a control unit (two models, one with a timer) and several slave modules which control lamps, appliances or wall switches. For more on the BSR system, see the articles by Mark Garetz, *Creative Computing* (Nov. and Dec. '79). The BSR system is sold by Radio Shack and Sears if you want to look at the modules.

The slave modules are controlled by signals injected onto your house AC lines. Up to 16 modules are controlled by one "house code" and up to 16 "house codes" are available—a total of 256 devices. The "house code" is intended for neighbors using the same power company transformer to avoid one household controlling another's lights.

SciTronics (523 S. Clewell St., P.O. Box 5344, Bethlehem, PA 18015) offers a BSR controller unit which can control all 256 devices. (The ones by BSR control one brief, badly organized and oriented to the hardware hacker. If you can't handle a soldering iron, get a skilled friend to help you.)

The connection scheme I used is shown in Figure 3.

Since the RC-80 has circuitry to detect when the AC line crosses zero, I intend eventually to connect CA1 to the zero detection circuits. If you are an advanced PET hacker note that CA1 can generate an interrupt usable for precise setting of the BSR units or as a power line controlled clock, which is more accurate than the PET's TI$ function.

When wiring this cable, take special care that your connections are correct. The order in the cable makes little sense, so crossing out your lines as they are hooked up is helpful. Double check every connection.

The next task is to set the board switches and modify several jumpers. The locations of these are clearly indicated in the Scitronics instructions. The settings I used are shown in Figure 4.

Most of these settings are already set on the board so changing the few jumpers and switches takes about 15 minutes for the soldering.

Now that the hardware is in place the real fun begins—getting the software to work! Since I want to cover this fairly well, you will have to wait for the next column. There's no more space. □

EDUCATIONAL SOFTWARE
TRS-80, COLOR COMPUTER, PET & APPLE II

ELEMENTARY — MATH
SCIENCE — BIOLOGY
GEOGRAPHY — HISTORY
ECONOMICS — ACCOUNTING
FOREIGN LANG. — BUSINESS ED.
GRAMMAR — FARM RECORDS
COIN INVENTORY

Write for FREE Catalogue:
MICRO LEARNINGWARE, Box 2134, N Mankato, MN 56001
(507) 625-2205
VISA & MASTER CARD ACCEPTED

We pay 15% royalty for Educational Programs listed with us.
TRS-80 is a registered trademark of TANDY CORP.
PET is a trademark of COMMODORE BUS. MACHINES.
APPLE is a trademark of APPLE COMPUTER CO.

CIRCLE 185 ON READER SERVICE CARD

Outpost: Atari

Mike Dunn

The guest author for this column is Mike Dunn, a busy pediatrician, who, among his many other hobbies, became enchanted with the Atari 800, started a newsletter, and is now preparing his first program for possible commercial release.

Getting Help

One of the nicest features of the Atari is its toll-free Help line. First try to figure it out yourself, as you will learn more, but if you can't, call Atari. The "Dear Abby" is Pam Yokum of Programming Services, always helpful on the phone, and, if she doesn't know the answer, will find out and call or write you with it. The telephone number is (800) 538-8547, except in California, where you call (800) 672-1404.

If you would like to know everything about your Atari, what each chip does and how you can make it do it, as well as the schematics and all the other "secrets" of this amazing computer, send $30 to Atari, Attn: Tom Harris, Customer Services, 1265 Borregas Ave., Sunnyvale, CA 94086 for a huge book, many hundreds of pages long, clearly written, and very interesting. Ask for the Operating System and Hardware manuals.

Spoiling the Fun

One of the unfortunate results of being involved with a computer is that you quickly discover that a computer can be as useful as the advertisements state. Mailing lists, database programs, word processing, and, especially, Visi-Calc are as useful as they say, taking time away from the "fun" side of computing.

Mike Dunn, M.D., A.C.E., 3662 Vine Maple St., Eugene, OR 97405.

VisiCalc is something else! After trying, without much success, to convince my partners that we needed to make some changes in our clinic, I had almost given up. One week after receiving VisiCalc, I put our entire operation on it, and in a two-day conference, used the "what-if" feature to show what these changes would mean to each person's income. The changes were adopted unanimously, more than making up for the cost of my entire computer system. Enough story telling; on with some hints and programs that should make your Atari more useful and fun.

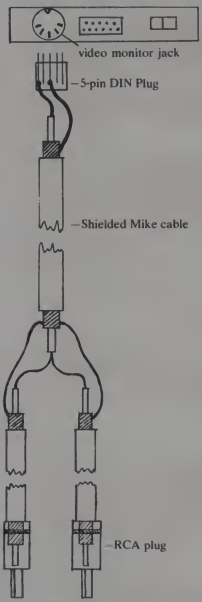
Atari in Stereo?

How would you like to listen to your Atari through your stereo system? It is especially impressive with the Music Editor (an excellent cartridge with which to learn music), or Star Raiders (for realistic sounds of the battle). It is easy to do if you know how to solder at all. On the side of the Atari by the ON switch is the video monitor jack. A 5-pin DIN plug to fit this is readily available at any electronic parts store. Counting counter-clockwise from the bottom five pins, you connect the shielded "mike" wire to pin 1 and the shield to pin 3. For mono, the other end is attached to an RCA-type plug, or for stereo, split into 2 and connected to the Stero. If your stereo has a mono switch, only the mono setup is needed. (See Diagram 1.)

Ersatz String Arrays

The Atari does not have string arrays. However, it does have numerical arrays, as well as an unusual feature that Microsoft Basic does not have, that is, variable names can be used in GOTO and GOSUB statements. These variables can be used in many ways, including simulating "string arrays" in a way I have not seen described before. (See Listing 1.)

Diagram 1. Stereo Adapter



World Class

Your **ATARI** is a world class personal computer. But you need great software in order to exploit its capabilities. And you need information about how it all works.

IRIDIS is a series of software packages that will help you enjoy and understand your **ATARI** more fully. The programs are outstanding, just as you would expect from the people who have published 23 issues of the widely acclaimed *CURSOR Magazine* for the Pet since 1978. But **IRIDIS** is more than just a collection of excellent programs. **IRIDIS #2** comes with a 56-page manual that has clear, detailed explanations of how each program works. The explanations tell you line-by-line what each program does, and how it does it.

IRIDIS and your **ATARI**: A winning team. World Class!

IRIDIS #2 - Fondedit and Knotwork programs.
Includes 56 page User Manual.
$15.95 Cassette, $18.95 disk.
Mastercharge and Visa welcome.

Published By:

THE CODE WORKS
Box 550
Goleta, CA 93116
805-683-1585

CIRCLE 209 ON READER SERVICE CARD

ATARI
PERSONAL COMPUTERS

16 K Atari 800 — $779.00
Atari 810 Disk Drive — $449.95

Atari 400 — $495.00

Complete line of Business & Game Software for the incredible Atari 800!

Coming soon — Emulator which will allow all Apple software to run on Atari*

Printers

TEC Daisy Wheel Printer for Atari: Apple, or Trs - 80. Built like a tank. Now you can have Word Processing at dot matrix prices

Special offer — $1,795.00
Centronics 737 — $499.00
IDS Paper Tigers — CALL*
Base 2 GRAPHICS PRINTER — $449.95
Epson MX - 80 — $589.95
Monitors

N E C Green Phosphor monitor — $219.95
Panasonic 9 1/4in — $179.00
Leedex 12" Green Phosphor — $189.00
Modems

D C Hayes Micromodem — $329.95
Source Hookups — $49.00
We service & help find software for all Atari, Apple, & N E C Computers regardless of where it was bought!*

We service & help find software for all Atari, Apple, & N E C Computers regardless of where it was bought!*

COMPUTER STORE OF GULF BREEZE, INC
37 Gulf Breeze Pky
Gulf Breeze, Florida 32561
Call
(904) 932 0660

CIRCLE 199 ON READER SERVICE CARD

Atari® 800™
List $1080
ATARI® only $759

400 8K	$419
400 16K	449
410 Recorder	62
810 Disk	489
815 Disk	1199
822 Printer	359
825 Printer	779
830 Modem	159
850 Interface Module	179
Microtek 16K RAM	99
Microtek 32K RAM	169
CX70 Light Pen	64
CX30 Paddle	18
CX40 Joystick	18
CX4121 Energy Czar	13
CX4108 Hangman	13

CX4102 Kingdom	$13
CXL4004 Basketball	30
CX4105 Blackjack	13
CXL4009 Chess	30
CXL4011 Star Raiders	45
CX4111 Space Invaders	18
CXL4006 Super Breakout	30
CXL4010 3D TicTacToe	30
CXL4005 Video Easel	30
CXL4104 Mailing List	17
CXL4007 Music Composer	45
CX4110 Typing	20
CX4101 Invit To Programming	17
CXL4015 TeleLink	20
CXL4003 Assembler Editor	46

Commodore

4032N	$1090
4032B	1090
8032	1499
C8M 2022 Printer	675
C8M 4040 Drive	1090
C8M 8050	1420
C8M CZN Drive	87
PET-IEEE Cable	37
IEEE-IEEE Cable	46
NEW VIC - 20	299

Printers

Trendcom 200	489
Epson MX-80	539
Commodore Tally 8024	1679

Software

WordPro 3 (40 col)	$186
WordPro 4 (80 col)	279
WordPro 4 Plus (80 col)	339
Visicalc- Apple	122
Visicalc- Atari	163
Visicalc- PET	163
Commodore Tax Package	399

To Order:
Phone orders invited (800 number is for order desk only). Or send check or money order. Equipment shipped UPS collect. Pennsylvania residents add 6% sales tax. Add 3% for Visa or MC. Equipment is subject to price change and availability without notice. Please call between 11 AM & 6 PM.

Computer Mail Order
501 E. Third Street
Williamsport, PA 17701
(717) 323-7921

(800) 233-8950

CIRCLE 263 ON READER SERVICE CARD

ADVENTURE
for your
ATARI 400/800

Vol.#1 THE QUEST

... and now, after the final battle, the remnants of humankind manage to survive in small bands scattered around the globe. Chaos and savagery reign supreme on the devastated planet. Can you discover the awesome secret that will save Earths dwindling populace from a fate worse than death? As you progress thru the more than 60 locations in this adventure, you encounter obstacles and aids, loathsome beasts and helpful strangers. But beware, one false move could mean doom both for you and all mankind. THE QUEST is the first volume in a larger, multi-part adventure. Completion of the entire adventure will require purchase of added volumes. Graphics and sound enhance this classic game.

16K/Tape-$14.95 24K/Disk-$19.95

SURVIVAL SOFTWARE
3033 LA SELVA, #B306
SAN MATEO, CA. 94403

CIRCLE 231 ON READER SERVICE CARD

Atari, continued...

As far as I can tell, this "string array" works just like that of other Basics. Using variable names with GOTO and GOSUB is useful in joystick controls, using the number generated by the STICK(N) command to go to a subroute.

Listing 1.

```
10 DIM A(4),A$(30)
20 X=INT(RND(0)*4)
30 A(0)=1000
40 A(1)=1001
50 A(2)=1002
60 A(3)=1003
70 GOSUB A(X)
80 PRINT A$
100 END
1000 A$="MONSTER"!RETURN
1001 A$="DOG"!RETURN
1002 A$="BIRD FROM THE SKY"!RETURN
1003 A$="MAN"!RETURN
```

Disk Menus

There are several menu programs in circulation, but they tend to be long and slow. These menus list to the screen the disk directory, so you can pick your program. The program in (Listing 2) is a very quickly loaded and run program for that purpose, and is especially useful for DOS II, as the new DOS is loaded in two parts. The new DOS takes only 3K of memory compared to the old DOS, which takes 8K, but the disk directory is loaded on demand, taking some time. Notice line 20, using wild cards to load every filename, and line 50, using the 6 command, a special input command that calls only the disc directory. Line 60 uses an error message 136 (EOF) to indicate that the input is finished, and directs the program to line 90, closing the #1 file, *always close* the open files with a CLOSE, END, or RUN command, or all kinds of strange bugs will occur in your program, especially when using disc files and the printer. The use of an error TRAP is handy to direct the program to a CLOSE statement.

Listing 2.

```
1 POKE 82,0:POKE 83,40
10 GRAPHICS 0
15 DIM FILE$(30)
20 FILE$="D:*.*"
50 OPEN #1,6,0,FILE$
55 OPEN #2,8,0,"E:"
60 TRAP 90:INPUT #1;FILE$
70 PRINT #2;FILE$,
80 GOTO 60
90 CLOSE #1
100 ? :? :? "   TYPE RUN "D:NAME
   TO ENTER PROGRAM"
```

Program 3 is a similar program, but is intended to be a subroute for another program to list the disk directory, as in Database where you would like to know what programs are stored on the disk. Note line 10000 and 19999. In line 10030, a comma after "C$" indicates a TAB, so two columns of names are printed on the screen. In the default mode of the Atari, the screen is 38 charactors wide, which causes the columns of words to print on the screen diagonally. The poke statements first change the screen width to 40 characters, allowing the columns to line up, then return to the default mode of 38.

Listing 3.

```
10000 ? :POKE 82,0:POKE 83,40
10001 DIM I$(15),C$(25)
10005 I$="D:*.*"
10010 CLOSE #1:OPEN #1,6,0,I$
10015 Z=1
10020 TRAP 19999:INPUT #1,C$
10030 PRINT C$,
10040 Z=Z+1
10050 GOTO 10020
19999 CLOSE #1:POKE 82,2:POKE 83,38:
      TRAP 40000
20000 RETURN
```

Cheap and Simple Word Processing Program

Here is a handy program (see Listing 4) that will turn your Atari and printer into an "intelligent" electric typewriter. You simply type in your text a printer line width at a time, and when you press RETURN, the line is printed just like an electric typewriter!

You can edit your line before printing by using the cursor as an editor. When it is not necessary to save a program, this is a very easy way to print and edit, especially for a poor typist who makes lots of mistakes. Note line 10, the 12 command that makes the screen editor an input and output device at the same time.

Listing 4.

```
1 DIM A$(256)
10 OPEN #1,12,0,"E:"
15 OPEN #2,8,0,"P:"
20 INPUT #1,A$
30 PRINT #2;A$
40 GOTO 20
```

The next program (Listing 5) illustrates how to make and change disk data files, and the different modes used. On line 10, we create a string, WORD$, in which to store our data. Line 20 uses the mode 12 to both input and output to and from the screen editor, using the cursor to input data, as mentioned above. Line 30 opens a disk file with mode 8, the output mode. To intialize a disk file, this mode must be used. On line 40, we input from the screen editor by typing in our words, remembering that the Atari operating system will allow only three physical lines without entering a RETURN; the computer will remind you with a "beep" at the end of the third line. When a file, especially a disk file, is opened it must be closed to be entered and completed. The TRAP 100 directs the program to line 200 with an error message. To generate the error message, press control-3, making an automatic error-136 (End of File) message. Line 50 prints to device #2, in this case the disk file, the words inputted from the screen editor above, and line 70 goes back to get the next line until the file is ended by your control-3 trap. The STOP is there so you can see what each mode does; use CONT to continue to the next step.

Line 200 opens the diskfile to input with mode 4, and the error message for the End of File trap is generated by the computer when the entire file is read.

Line 320 opens a file already existing and allows you to add to the file. If mode 8 is used, the existing file is destroyed in making the new one, but in mode 9, it is not, so you can add to the file, without loading to the screen editor first.

These programs illustrate how to use the different modes Input and Output commands. There are actually many more I/O commands using the XIO statement, that allow even more flexibiltiy. The Atari Basic Reference Manual describes 16 such commands, and the Atari 850 Interface Manual has many more, used mostly to configure the various I/O ports for any possible use. □

Listing 5.

```
1 REM CREATE FILE
10 DIM WORD$(256)
20 OPEN #1,12,0,"E:"
30 OPEN #2,8,0,"D:TEST1"
40 TRAP 100:INPUT #1;WORD$
50 PRINT #2;WORD$
70 GOTO 40
100 CLOSE #2:STOP
199 REM READ FILE
200 OPEN #2,4,0,"D:TEST"
210 TRAP 250:INPUT #2;WORD$
220 PRINT #1;WORD$
230 GOTO 210
250 CLOSE #2:STOP
299 REM APPEND (ADD TO FILE ABOVE)-NEW WORDS AFTER OLDFILE
310 CLOSE #1:OPEN #1,12,0,"E:"
320 OPEN #2,9,0,"D:TEST"
330 TRAP 390:INPUT #1;WORD$
340 PRINT #2;WORD$
350 GOTO 330
390 CLOSE #2:STOP
399 REM APPEND- NEW WORDS BEFORE ABOVE OLDFILE
420 OPEN #2,1,20,"D:TEST"
430 TRAP 490:INPUT #1;WORD$
440 PRINT #2;WORD$
450 GOTO 330
490 CLOSE #2:STOP
```

APPLE II AND APPLE II PLUS USERS!

FREE YOUR MIND

-WITHOUT TYING UP YOUR DISKS!

- COPY AN ENTIRE DISK TO TAPE IN A SINGLE PASS!
- BACKUP BOTH DOS 3.2 AND 3.3 DISKS
- TRUE READ-AFTER-WRITE VERIFY PASS
- SAVE DATA INEXPENSIVELY OFF LINE
- FREE UP VALUABLE DISK SPACE
- MAIL DISKS ON DURABLE CASSETTES
- EACH TAPE HAS SELF-LOADING SOFTWARE
- SAVE AT LEAST 2 DISKS PER CASSETTE
- PAYS FOR ITSELF IN MEDIA SAVINGS (AS WELL AS PEACE OF MIND)
- ONLY ONE DISK DRIVE NEEDED

DISK-O-TAPE

$12.95 POSTPAID, FIRST CLASS DELIVERY FROM

Dann McCreary
BOX 11455 - 22
SAN DIEGO, CA
92111

OVERSEAS AIRMAIL ADD $1.00
CALIFORNIA RES. ADD 6%

(714) 277-5041

CIRCLE 153 ON READER SERVICE CARD

ATARI® 400/800*

Machine Language Monitor & Disassembler

- Displays memory in HEX and ASCII.
- Enter, modify and execute your own programs.
- Disassemble RAM, operating system or cartridges.
- Bootable tape independent of BASIC.
- Exit Monitor and return via SYSTEM RESET.
- Supports breakpoints.
- And many more features!

An indispensable tool for the novice or experienced programmer

Available on cassette tape with complete documentation for only

the computer kitchen **$19.95**

P.O. Box 70524 CA Res. Add Tax
Sunnyvale, CA 94086 *Trademarks of Atari Inc

CIRCLE 143 ON READER SERVICE CARD

WE WILL TRY TO SELL THE

following products at the lowest

ADVERTISIED PRICES IN THIS MAGAZINE

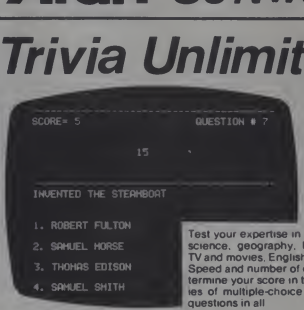
PET APPLE ATARI CROMEMCO

MISSISSIPPI MICROS, INC.
Mart 51, Jackson, MS. 39204
(601) 948-7846

CIRCLE 177 ON READER SERVICE CARD

Atari Software

Trivia Unlimited

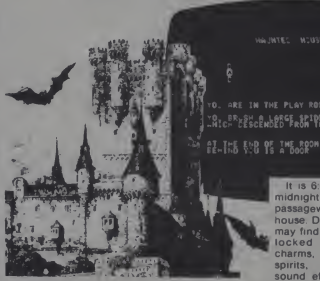


Cassette CS-7001 $11.95

Disk CS-7501 $19.95

Test your expertise in any of seven areas: science, geography, history, computers, TV and movies, English language, or trivia. Speed and number of correct answers determine your score in this challenging series of multiple-choice quizzes. Over 200 questions in all. Requires 24K

Haunted House



Cassette CS-7003 $11.95

Requires 32K

It is 6:00 and you have until midnight to find the secret passageway out of a haunted house. During your search, you may find skeleton keys to open locked doors, good luck charms, friendly ghosts, evil spirits, and skeletons. The sound effects (creaking doors and stairs) add to the eeriness. The house layout changes in every game.

Other Atari Software—

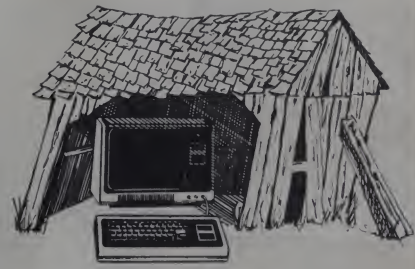
- Outdoor Games (Forest Fire, Fishing Trip, Treasure Island 1 & 2). Cassette CS-7002, $11.95
- Outdoor Games and Haunted House. Disk CS-7502, $24.95
- Hail to the Chief (Presidential election simulation) Cassette (32K) CS-7201, $24.95; Disk (40K) CS-7701, $24.95

Order using handy postcard bound in back of magazine.

Creative Computing Software

CIRCLE 300 ON READER SERVICE CARD

TRS-80 Strings



Stephen B. Gray

In this 29th column, we examine a short program to cure keybounce. Radio Shack's debounce firmware, problems with using machine language on the Model III, several TRS-80 publications, a Creative cassette of ecology simulations, Microsoft's Editor/Assembler-Plus, a program-copying program, and a short program that displays a moving bracketed zero.

Keyboard Debounce

If you have a problem with extra characters appearing on the screen when you enter programs, you can take care of it in two ways.

You can, as suggested in the article on "Debouncing Your TRS-80" (May 1980, p. 134), pry up the offending keys and clean the contacts underneath.

Or you can follow the advice of Ben Moser, of Stanley, VA, who writes:

"Possibly the TRS-80's most irritating shortcoming is its unreliable keyboard. Of course, I'm referring to the phenomenon known as *keybounce*.

"On my old TRS-80, when I'm touch-typing in a program, I usually get two or more 'E' characters when I tap the key once. Other characters echo also, but the 'E' key seems to be the most notorious.

"People who type rapidly don't have time to proofread each program line as it is entered, and often the mistake will not be found until the program is run.

"Also, keybounce leads to more insidious problems. Suppose one intended to enter LET N=10 but the zero key echoed, causing the goofy LET N=100 to be entered instead. In a large program, such errors can occur dozens of times. Needless to say, a programmer can get angry looking for simple typographical errors.

"So much for the TRS-80's keybounce problem. Radio Shack tells one to remove the keys and clean the contacts beneath. I tried that and found it doesn't work.

"However, some companies offer 'debounce' programs. That's good, except that they usually reside in the high area of memory.

"I wrote my own debounce program (in machine language) that can be entered as a short Basic program. The patch lives in the unused Level-III keyboard vector area (beginning at 16722). I find that my program eliminates almost all keybounce.

"This program has only a few disadvantages: (1) it must be entered every time one turns the computer on; (2) it slows down Basic execution speed by about 5 to 10 percent; (3) it can't be used with Disk Basic, but it is easily relocated to an unused area of memory.

"Its one major advantage is that it does not interfere with the amount of memory available to the Basic programmer.

```
100 FOR X=16722 TO 16745
110 READ Z
120 POKE X,Z
130 NEXT X
140 END
150 DATA 33,91,65,34,22
160 DATA 64,195,25,26,245
170 DATA 62,255,254,0,40
180 DATA 4,214,1,24,248
190 DATA 241,195,227,3
```

"How to use:

1. Turn on the TRS-80.

2. Either type in my program, or load it from tape.

3. RUN the program.

4. Type SYSTEM to enter SYSTEM mode.

5. In response to the *? prompt, type /16722. This patches in the keyboard-scan-delay program.

6. Type PRINT MEM. You will get ?OM ERROR.

7. Type PRINT MEM again. This time, Basic will be operating normally.

"At this point, you can type MEM and use the computer as you normally would.

"One problem with this program, because it uses the Disk Basic jump vectors, may arise if certain Disk Basic functions or commands are used in conjunction with the debouncer. Most likely, these commands will crash the computer. This should not be a problem, since the vast majority of programs make no use of the weird Disk Basic functions."

Debounce Firmware

In the latest Model I Level II TRS-80, Radio Shack shortened their name to R/S in the power-up display, shortened MEMORY to MEM, and used the space in ROM to insert a short debounce routine plus a routine that corrects some of the cassette timing problems.

That second routine made the cassette interface more tolerant of different record or playback speeds and of poor-quality tapes, as well as making the volume-control setting less critical.

The Model I had two keyboard styles. First, the stepped tops, which used metal contacts that were more susceptible to keybounce than the later design of metal contacts used with the sculptured keys, which had dish-shaped tops.

The Model II has a separate microprocessor, an Intel 8021, to take care of the debounce. The Model III has a keyboard very much like the Model I sculptured keyboard, and also has a debounce algorithm in ROM, as does the Color Computer.

MODEL II

26-4002
64K 1 Drive
$3440.00

26-4160 1 Drive Exp.	$1034.00
26-4161 2 Drive Exp.	1574.00
26-4162 3 Drive Exp.	2114.00
26-4530 Scripsit II.	265.00
26-4512 Profile II.	162.00
26-4511 Visicalc II.	265.00
26-4501 Gen Ledger	180.00
26-4506 Mail List	72.00

$ DISCOUNT $

TRS-80®

DEALER A301

COMPUTER SPECIALISTS

CALL US. . .
SAVE MONEY

We carry the full line of TRS-80 Computers. All other R.S. software, furniture, and accessories at discount from catalog price. We stock most items to assure you fast delivery and save you money.

PRINTERS

26-1140 Expansion Interface	$249.00
26-1141 16K Exp. Interface	359.00
26-1142 32K Exp. INterface	469.00
26-1145 RS232C Board	84.00
26-1160/1 Mini Disk Drive	419.00
26-1563 Scripsit-Disk	79.00
26-1566 Visicalc	83.00

• • • • • •PRINTERS• • • • • •

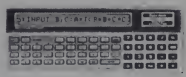
26-1155 Quick Printer	187.00
26-1167 9½ Dot Matrix Printer	360.00
26-1166 Line Printer VI	1080.00
26-1158 Daisy Wheel II	1799.00
26-1165 Line Printer V	1710.00

CENTRONICS

BEST PRICES

Fast 100 CPS Centronics
730-1A Printer $577.00
Text Quality Centronics
737-1 Printer $737.00

Pocket Computer



26-3501 1 9K P.C.	$221.00
26-3503 Cassette IF.	45.00
14-812 Recorder	72.00

MODEL III

26-1061 4K I	$629.00
26-1062 16K III.	865.00
26-1063 32K III	
W 2 Drives, RS232	2225.00

COLOR

26-3001 4K	$353.00
26-3002 16K Ext Basic	533.00
26-3008 Joysticks	22.50
26-3010 Color Video	353.00
26-1206 Recorder	54.00

commodore

AUTHORIZED DEALER
CALL FOR PRICES

ALL POCKET AND COLOR COMPUTER SOFTWARE SOLD AT DISCOUNT

WRITE US FOR A
FREE CATALOG

1-800-841-0860 Toll Free Order Entry

MICRO MANAGEMENT SYSTEMS, INC.

No Taxes on Out Of State Shipments

Immediate Shipment From Stock on Most Items

DOWNTOWN PLAZA SHOPPING CENTER
115 C. SECOND AVE. S.W.
CAIRO, GEORGIA 31728
(912) 377-7120 Ga. Phone No. & Export

TRS-80 is a registered trademark of the Tandy Corp.

R.S. 90 Day Limited Warranty
F-48 Form Provided

Largest Inventory In The S.E. U.S.A.

CIRCLE 163 ON READER SERVICE CARD

TRS-80, continued...

I/III Compability

Model I programs in Basic are upward-compatible with the Model III, which has a few new features, including RS-232 routines, a real-time clock, and "stuff to facilitate the international use of the computer, such as in Japan," according to one of the TRS-80 designers.

The Model III character generator has some scientific symbols, along with several dozen Japanese katakana, which are simple syllabic characters that can be used to write anything in Japanese that can be written with the more complex ideographic Chinese characters. On the III, you can intermix English and katakana. Future models of the III may also contain European-language accent marks.

You may have heard that Model I Basic programs that include machine language won't run on a Model III TRS-80. "That depends on the machine language," says the TRS-80 designer. "Some of the hardware has been changed, but there's no problem if you use the machine language in our editor assembler manual. There may be if you use machine language from *Inside Level II BASIC* or disassembled listings, or similar pirated stuff."

TRS-80 Publications

It's time to take a look at some of the TRS-80 publications that have changed since last reviewed here, and also at some others that haven't been mentioned here yet.

SoftSide

SoftSide was first published in October 1978 as a 56-page magazine in small 5 1/2-by-7 1/2-inch) format, and was reviewed here in January 1979 (p. 28).

With the February 1980 issue, it became *SoftSide: S-80 Edition*. This was because Apple Computer Co. had asked the publisher to change the name of another of their publications, *AppleSeed*, to something else, and it had become *SoftSide: Apple Edition*.

Starting with the August 1980 issue, the TRS-80 and Apple editions were combined, along with *PROG|80*, into one magazine, around 96-pages long and also larger, 8 1/2 by 11 inches, and the Atari computer was added to the mix.

The new *SoftSide* is sometimes called "SuperSoftSide" by it editorial staff, to distinguish it from previous incarnations. It now includes material of the type once published in *PROG/80*, a more technical TRS-80 publication, "dedicated to the serious programmer," according to the cover and reviewed here in July 1979 (p. 112). It was first published in March 1979, and lasted until August 1980.

SoftSide now gets into *PROG/80* material in a section called "Heavy Stuff," with articles on string packing and the NEWDOS 80 CHAIN command, for instance.

The new triple-computer *SoftSide* is, as was the original magazine, heavy on games and *SoftSide* ads. A recent 100-page issue contains 45 pages of ads for *SoftSide* publications, software and hardware, out of a total of 54 1/2 pages of ads. That 54.5 percent of ads is even higher than the old *SoftSide*, which ran something like 41 percent ads in a typical issue.

Software is sold through The Software Exchange division, hardware through the HardSide division, and a $2 quarterly "Compleate Computer Catalogue" covers both, plus offering back issues of *SoftSide*, which in its current format is $18 a year for 12 issues. For $75 a year you get both the magazine and the issue's programs on cassette, or $129 on diskette, for either TRS-80, Apple, or Atari.

The publisher is SoftSide Publications, 6 South St., Milford, NH 03055. The reasons given in the October 1980 *SoftSide* for combining the three publications was "partly financial" and also "a lot of expense and duplication of effort."

The S-Eighty

Another SoftSide publication, *The S-Eighty*, was published from January 1980 to July 1980, and was free to any TRS-80 owner who requested it. A typical 32-page issue in late 1980 contained pages of ads, two letters from readers, two pages of new products, a review of a Radio Shack program and another of a Med Systems Software program, and one article on graphics.

The S-Eighty was a victim of a serious disease known as "not enough outside ads."

Computer Shopper

An advertising newsletter called *ON-LINE* was published at one time by Dave Beetle, and reviewed here in May 1979 (p. 129). It contained brief ads for everything from programming forms to line-surge protectors, and a dozen or two ads for TRS-80 items such as memory kits and used systems. It also listed user clubs.

ON-LINE's last appearance was December 14, 1979, with Volume 4, Issue 15. Dave sold it to the publisher of the new *Computer Shopper*.

Whereas *ON-LINE* was 6 by 9 inches, and usually 40 pages long, *Computer Shopper*, first published in January 1980, is tabloid size, 11 1/2 by 14 inches, typically 48 to 56 pages long, and is $10 a year for 12 issues from Patch Publishing Co., Inc., Box F, Titusville, FL 32780.

Computer Shopper goes far beyond *ON-LINE*, with ads, typically, for computers (Burroughs, Data General, Datapoint, DEC, IBM, NCR), micro computers (Apple, Northstar, Ohio Scientific, PET, TRS-80, S-100, S-50), peripherals and miscellaneous equipment (card readers, disk drives, modems, etc.), and employment.

A recent issue contained 66 classified TRS-80 ads and some 15 TRS-80 display ads, for new and used computers, computers wanted, software, and peripherals.

Insiders

Subtitled "TRS-80 hardware journal with machine software," *Insiders* was reviewed here in October 1979 (p. 175). At $7.50 for six undated issues, it is published by Computer Cablevision Inc., 2617 42nd St. N.W. #2, Washington, DC 20007.

There has been a gap in the publishing of *Insiders*, starting with issue 16 for May/June 1980. A guest editor was to have taken over for the following issue, but didn't have the material ready in time, showing up in October with too little. Issue 17 was to have been published in February 1981.

The gap will be taken up by sending subscribers a copy of *THE BOOK II: Accessing the TRS-80 ROM*, part of a three-volume set. The first, which has been advertised in *Creative*, is about math routines. The second will be on I/O: how cassette, keyboard and video routines work. The third will be on the operations of strings, the editor, etc.

Introducing... Gambiet '80

A Microcomputer Chess Program in a Class of Its Own

Gambiet '80 is rapidly gaining the respect of chess enthusiasts worldwide.

Designed for the TRS80, Level II with 16K of RAM.

Gambiet '80 offers six levels of play, graphic board display, chess clock, "take-back" facility and many other features.

Gambiet '80 is available at a very conservative price, $39.95.

microtrend

Please send ____ copies of Gambiet '80 @ $39.95 ea.

Name _____

Address _____

City _____ State ____ Zip _____

Phone (___) _____

Check _____ Mastercard _____ Visa _____

Card # _____ Expir Date _____

Signature _____

MICROTREND, U.S.A.
1900 Plantside Drive
Louisville, KY 40299
1-800-626-6268

CRC

CIRCLE 233 ON READER SERVICE CARD

AUTHORIZED TRS 80® DEALER #R491

$670.00 MODEL I
16K Level II with Keypad
26 – 1056

$3500.00 MODEL II
MODEL II, 64K
26 – 4002

$875.00 MODEL III
MODEL III 16K RAM,
MODEL III BASIC
26 – 1062

WE ACCEPT CHECK, MONEY ORDER, OR PHONE ORDERS WITH VISA OR MASTER CHARGE. SHIPPING COSTS WILL BE ADDED TO CHARGE ORDERS. DISK DRIVES, PRINTERS, PERIPHERALS, AND SOFTWARE – YOU NAME, WE'VE GOT IT. WRITE OR CALL FOR OUR COMPLETE PRICE LIST.

FULL FACTORY WARRANTY ON ALL ITEMS SOLD.

C & S ELECTRONICS, LTD. 32 EAST MAIN ST. MILAN, MICH. 48160
(313) 439-1508 (313) 439-1400

C & S ELECTRONICS MART IS AN AUTHORIZED TRS 80® SALES CENTER STORE #M81

CIRCLE 119 ON READER SERVICE CARD

There's only one practical way to turn your TRS-80® into a serious business computer.

Call us.

We've got the systems.
16 different ones, all interacting, all integrated with the general ledger, for the Model I, II and III.

They're tested.
In 1200 businesses all over the world.

And they really work.
Our competitors call them "the standard of the industry"

Taranto
ASSOCIATES, INC.

The Total System Store™
121 Paul Drive, San Rafael CA 94903
Outside California, toll free (800) 227 2868
In California (415) 472-2670

*A trademark of the Tandy Corporation

CIRCLE 236 ON READER SERVICE CARD

TRS-80, continued...

Each issue of *Insiders* contains several assembly-language programs, articles on assembly-language programming, and reviews of hardware and software. It is probably the best publication for TRS-80 assembly-language aficionados.

Ecology Simulations-1

This is the title of a $24.95 *Creative Computing* cassette for 16K Level II TRS-80 computers, with four population-study programs.

The four were originally developed by Dr. Ludwig Braun and others at The State University of New York at Stony Brook, as part of the Huntington II Computer Project, partially sponsored by the National Science Foundation.

The programs are on population-growth models (POP), the sterile-male technique of insect control (STERL), "tagging and recovery" method for wildlife population study (TAG), and buffalo-herd management (BUFFALO).

They can be thought of as games, but were developed for the more serious purpose of trying to predict the future, by using simulation models to imitate the events that make up real-world situations.

POP

POP tries to demonstrate the strengths and weaknesses of population projection by showing how three simple population-growth models give "vastly different projections for a sample populations's growth," according to the detailed 20-page booklet that fits into a pocket in the little one-piece binder that holds the cassette: a very neat little package.

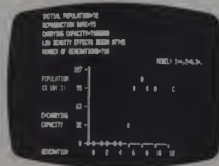
These are not simple games with rules and parameters that can be learned in a few minutes. POP requires that you give the computer information on five factors: initial population, reproduction rate, number of generations, carrying capacity, and low-density values. You've got to learn to supply reasonable figures for each, if the simulation is to have any meaning.

Model 1 is a simple model, including only the first three factors. Because factors such as food and environment aren't included, this model allows growth without limit, so it's called the exponential model.

You give POP the required data, and POP graphs the results, showing population changes over time (generations).

The booklet gives some sample input data, such as reproduction rates for the fruit fly, elephant, and human; you can use any one of these in your population model, or look up other rates elsewhere and go off on you own.

RUN the program, and the second display is a graph showing you what to expect from a sample set of data. The program has two modes: you choose one set of data and see its effect in each of the three



models, or you choose one model and see how it is affected by different data.

Model 2 includes factors 1-4, and is the S-shaped or logistic model. It introduces the fourth factor—carrying capacity—which is the maximum population the environment can support over an extended period. With this one, you could study the effects of how population size might vary over ten generations if the 10-square-mile forest in which two gypsy moths live can support only 500,000 moths

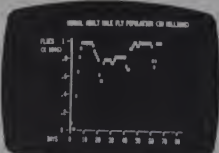
Model 3 adds the low-density factor—the population size at which low-density effects are first noted—and can refer to the minimum population necessary for easy mate location.

The booklet provides information on using POP in the classroom, with four detailed exercises for each of the three models; similar information is provided for the other three programs.

STERL

Using STERL, you investigate the effectiveness of two very different methods of pest control: the use of pesticides, and releasing of sterile males.

You enter data on which method will be used, which days you want pesticides used or sterile males released, how many flies, etc. STERL prints a graph to show the number of normal adult male flies in the area over a 75-day period, gives you the cost of the control program, and an estimate of the dollar damage caused by the flies in your area.



TAG

The TAG program involves estimating the bass population in a warm-water bass/bluegill farm pond, using tags attached to the fish and checking later on sample fish caught for tag inspection.

The factors are: number of tagged bass, time elapsed between samplings, sites to investigate, and number of fish caught at each site.

BUFFALO

The last program, involving managing a herd of buffalo, includes factors such as whether you want total freedom of herd control or automatic safeguards for herd population, how many years for herd observation, how often to change the harvesting policy, etc.

The four programs on this cassette provide a fairly simple yet fascinating introduction to population studies, not only for the classroom, but also for the sophisticated gameplayer looking for something more cerebral and relevant than shooting down space ships or exploring caverns.

Microsoft Editor/Assembler-Plus

If you're really into TRS-80 assembly language, to the point that you'd like an assembler that does more than Radio Shack's, you may be interested in Microsoft's Editor/Assembler-Plus.

Radio Shack sells an editor/assembler tape for the 16K Level II computer for

$29.95, and the T-Bug machine-language monitor for $14.95. For $29.95 you get Microsoft's Editor/Assembler-Plus, which adds "many powerful features to the basic capability" of the Radio Shack EDTASM, plus Z-bug, "a completely new design of a 'big-system' debugger," according to the manual that comes with the Microsoft product. It is available at your local computer store or, for an additional $2.50 for postage and handling, from Microsoft Consumer Products, 400 108th Ave. Northeast, Suite 200, Bellevue, WA 98004.

EDTASM-PLUS

With Microsoft's Editor/Assembler-Plus (EDTASM-PLUS), you assemble TRS-80 assembly-language programs directly into memory, without having to write object programs out to cassette tape and then load them. EDTASM-PLUS also has a macro capability, which automatically generates in-line code by calling up an assembly-language macro, which is set of predefined instructions.

EDTASM-PLUS was written by Mark L. Chamberlin and William E. Yates. Chamberlin is the author of the original Radio Shack editor/assembler, to which have been added features such as line-number offsets, new line-range specifications, a block edit, moves and copies of blocks, string find and substitution commands, automatic line extensions, and the ability to "quash" portions of EDTASM-PLUS to obtain additional text-buffer area.

Z-Bug

Because the editor, assembler and Z-Bug are all resident at one time, the user can edit source programs, assemble then into RAM memory, and then debug them without having to change tapes.

The Z-Bug debugger provides functions normally found only in larger computer systems, including symbolic debugging based on the assembler symbol table, byte, word, mnemonic, and ASCII formats; up to eight breakpoints; user-defined number bases; and single-instruction stepping.

The excellent, detailed 112-page manual was written by William Barden Jr., author of such books as *Z-80 Microcomputer Design Projects* and *Z-80 Microcomputer Handbook*.

Short Program #17

Andy Johnsen of Concord, CA, sent in a very short and very clever Level II program with a short note:

```
0 K=K+N:TROFF:CLS:PRINT@K,"*";:TRON:X$=
INKEY$:IFX$=""THEN0ELSEN=VAL(X$):GOTO0
1 CLEAR10N ERROR GOTO11N=11K=0:GOTO0
```

"To execute, type RUN 1. When entering into the computer, pay particular attention to punctuation. To change the speed, press any digit from 0 to 9."

A zero is displayed between brackets, TRON-fashion, and flickers across and down the screen very slowly. If you press any of the keys from 1 through 9, the bracketed zero runs proportionally faster with a higher number, slower with a low number.

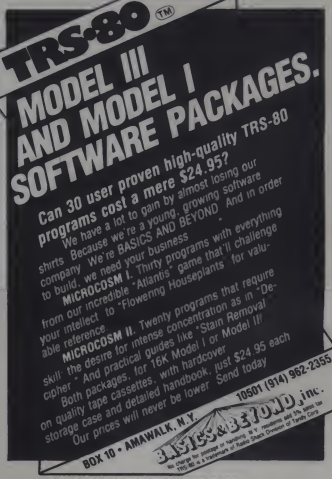
When the bracketed zero starts over again at the top left, the speed is reduced to the slowest. If you press zero, or a letter key, the bracketed zero stops, and is started up only by pressing a key from 1 through 9. Entering RUN 0 or RUN will eventually cause error messages.

The program was submitted as a computer printout, 6 1/4 inches across, too wide to be printed in a single narrow column. If you try to break it up into individual statements, beginning like this:

```
100 K=K+N
110 TROFF
120 CLS
 ...  ....
```

the program runs almost the same, but instead of a zero in brackets flitting across and down the screen, the display consists of a train of three or four numbers in brackets. □

Stock Market
Sea Wolf
NEW! ASCII
for the TRS-80*
Every month you receive a certified ASCII C-20 cassette containing: a covar page with a directory of programs
4 original programs
an information packed newsletter
and information on ASCII funded contests
Rates: 1 year [12 issues] $40.00
6 months [6 issues] $25.00
Sample issue $ 5.00
Write For Overseas Rates
To subscribe, write to: ASCII
P.O. Box 516, Valley Stream, N.Y. 11582
Or call: 516-791-4890
Level II16K Required
*TRS-80 is a product of Tandy Corp.
Star Wars Trench
Makes A Great Gift
CIRCLE 116 ON READER SERVICE CARD


TRS-80 ™
MODEL III AND MODEL I SOFTWARE PACKAGES.
Can 30 user proven high-quality TRS-80 programs cost a mere $24.95?
We have a lot to gain by almost losing our shirts. Because we're a young, growing software company. We're BASICS AND BEYOND. And in order to build, we need your business.
Thirty programs with everything from our incredible "Atlantis" game that'll challenge your intellect to "Flowerng Houseplants" for valuable reference.
MICROCOSM I. Twenty programs that require skill, the desire for intense concentration as in "Decipher." And practical guides like "Stain Removal."
MICROCOSM II. Twenty programs that require cipher. And practical guides like "Stain Removal." Both packages, for 16K Model I or Model III on quality tape cassettes, with hardcover storage case and detailed handbook, just $24.95 each. Our prices will never be lower. Send today.
BOX 10 • AMAWALK, N.Y. 10501 (914) 962-2355
BASICS & BEYOND, inc.
CIRCLE 112 ON READER SERVICE CARD

FREE FREE FREE
FREE FREE FREE

SIMUTEK'S SENSATIONAL COMPUTER CATALOG

100's of programs for all the popular computers.

Free Program Listings and Articles

Fantastic Low Prices On:

Printers, Disc Drives, Computers, Diskettes, Video Monitors, Expansion Interfaces, Speed-up Mods, Color Graphic Boards, Speech Synthesizers and much more.

Don't wait! Call or write for your free giant catalog today.

Write:

SIMUTEK COMPUTER PRODUCTS™
4877 E. Speedway Blvd.
Tucson, AZ 85712
(602) 323-9391

Name _____
Address _____
City _____
State _____ Zip _____

Or Call Toll Free 800-528-1149

CIRCLE 258 ON READER SERVICE CARD

The WORKSHEET Problem-Solving Language

Want to play "What-if"? Want to do Real Estate Analysis, Family Budgeting, Taxes, Company Cash Flow; want to simulate complex and interrelated processes? WORKSHEET is a powerful language designed for the purpose of writing programs to solve these and all other problems that involve a row-column "spreadsheet". Even novice programmers are solving complicated problems on the first day!

WORKSHEET is not a hybrid text editor or a toy. **It is a complete, self-documenting model-building system.** List the assumptions that went into your budget with the SHOWFIL program—even the boss will understand!

Change the assumptions, the relationships, or the data, and produce a new spreadsheet, neatly captioned, in minutes.

Model too big to fit on a single page? Format it dynamically—one page of 12 (or any number) columns, or 2 pages of 6 columns, or whatever tells your story best.

Conditional evaluation of a variable? Reference to variables in different rows, several columns back? No problem!

Sample models include portfolio valuation, real estate evaluation, iterative solution of a Diophantine equation, family budget, product profit based on exponentially damped growth of sales.

Use it for tough, professional jobs—it's the only CP/M modeling system that can handle them!

Requires 48K CP/M system and Microsoft Basic-, C Basic-, or North Star Basic running under CP/M with Matchmaker II.

WORKSHEET Language disk (5" or 8" CP/M) $199.95
(specify version)
80-Page Manual only . . . . . $ 19.95

The SoHo Group
140 Thompson St., Suite 4-B
New York, NY 10012

Note: CP/M, Microsoft, and North Star are registered trademarks of Digital Research, Microsoft, and North Star Computers, respectively.

CIRCLE 227 ON READER SERVICE CARD

Book Reviews

Stephen B. Gray

Why Do You Need A Personal Computer?, by Lance A. Leventhal and Irvin Stafford. John Wiley & Sons. New York. 287 pages, paperback $8.95. 1981.

This is another in the growing list of fine microcomputer paperbacks from Wiley, and is one of the best on what you can do with a computer, how to program it, and what to buy.

The eight chapters are: Your Own Computer. Components of a Computer. Introduction to Basic Programming. How to Write a Program. Peripherals. Interfacing. Computer Operation and Maintenance, and Selecting a Computer.

Seven appendices include a glossary, codes, electrical components (for the kit-builder), interface standards, magnetic-recording techniques, TV-signal standards, and standard flowchart symbols.

The first chapter provides dozens of uses for a computer, from games to music, and looks at the basics of hardware and software, which are amplified by the second chapter, in great detail and with many photographs.

The Basic chapter provides a fine explanation of the language and gives three program examples: arithmetic quiz, inventory control, and Monopoly.

The chapter on writing programs can be recommended to those who have been writing them awhile, because of the excellent material about flowcharts, top-down design, and especially the long and valuable section on debugging, which includes dozens of suggestions on where to look for errors.

The remaining chapters are equally detailed, especially the last one, which goes into areas that few if any other authors have covered, including Buying For Your Background, and Planning For the Long Term.

This is one of Wiley's best, and is a great improvement over the original manuscript I was privileged to review for the publisher last year.

A Consumer's Guide to Personal Computing and Micro-Computers, by Stephen Freiberger and Paul Chew Jr. Hayden Book Co., Rochelle Park, NJ. 208 pages, paperback $8.95. Second edition, 1980.

First published in 1978, this second edition "updates prices, the latest developments in microcomputer technology, and a review of over 100 microcomputer products from over 60 manufacturers," according to the back cover.

After five short chapters on basics, input/output devices, hardware and software, the book devotes two-third of the text to a four-chapter catalog of available hardware.

Chapter 6. Microcomputer Systems. covers the Heathkit H8, Sorcerer, Radio Shack TRS-80, Atari 800, Apple II, PET, etc. A brief description of each is followed by a data summary of the specifications.

Chapter 7. Limited Input/Output Systems and Systems on a Card. looks at the Heathkit Microprocessor Trainer, COSMAC VIP, KIM, Elf, etc. Chapter 8. Microcomputers in a Cabinet. includes the Gimix System 68, Quay 8000, etc. Chapter 9. Microcomputers on a Card and CPU Cards. covers 48 cards, most of which are not intended for personal-computer use. Likewise, a dozen of the computers in the previous chapters are commercial computers, or software development systems, or evaluation boards.

Also, and more important, most of the comments in this edition are still laudatory, and no adverse comments are made about many computers that are generally known to have problems.

As with the first edition, this also ends with a four-page Reader Response Survey intended to "provide reader feedback and suggestions to the authors." I'd suggest a more realistic approach, better paper, and a typeset text rather than typewritten one, all of which would help keep the book from looking too much like a "quickie."

Z80 Software Gourmet Guide & Cookbook, by Nat Wadsworth. Scelbi Publications, 20 Hurlbut St., Elmwood, CT 06110, 323 pages, paperback $15.95, 1979.

Patterned after the Scelbi *8080, 6800 and 6502 Software Gourmet Guide and Cookbooks* written by Robert Findlay, this is a follow-on from Wadsworth's 120-page *Z80 Instruction Handbook*, published in 1978.

According to the front cover, with this book you can "put together your own Z80 programs using these time-tested recipes: utility routines, stack operations, search and sort routines, floating-point routines, Z80 instruction set, and more."

The book contains routines, subroutines and short programs, in ten chapters that include the five listed on the cover, plus input/output processing, conversion routines, decimal arithmetic routines, space capture, and creative programming concepts.

The six appendices provide the entire Z80 instruction set (each with a page number to indicate where it's discussed in detail), octal-to-hex and hex-to-octal conversion charts, ASCII and Baudot character sets, and a memory dump of the floating-point program presented in the text.

As with the previous *Gourmet Guide and Cookbooks*, if the Z80 programs you want to concoct can be whipped up from the contents of this book, which is written very clearly, you may find it useful. But the introductory material is rather compressed, so this would be more useful to a person already familiar with programming than to a novice, who needs more than just a chapter on the Z80 instruction set to get him going.

Computers and Management In a Changing Society, by Donald H. Sanders and Stanley J. Birkin. McGraw-Hill Co., NY, 505 pages, paperback $12.95, Third edition, 1980.

"Computers continue to play an ever-increasing role both in our everyday lives and in organizations of all types. Within these organizations the impact of computerization results in tremendous change and present management in many situations with one of the most difficult of all contemporary challenges," according to the opening of this textbook's preface.

"In order to prepare for a successful working relationship with ... computerized information systems, present and potential managers must (1) learn about the computer ... and

micromath

MICROMATH
revolutionizes the teaching of math!

Grades 6 to 12

MicroMath is a complete review mathematics course which will be of great value to students from grade 6 through 12.

93 Lessons, 16 Tests, 150 Page Workbook

Students learn a unique, from 93 separate lessons, each with pre-test and tests, mixed with work in tutorially at their own speed with peers or individually. Each unit has its own post-test and the entire package is supplemented with a 150 page workbook.

Runs on COMMODORE PET 16K and APPLE II+

PET version consists of 5 disks, the APPLE version has 10 disks.

Presently in use across Canada and the U.S.

MicroMath is the only full computerized course of its kind in North America and is highly praised by those using it.

$500.00 for complete package (U.S. funds)

A demonstration disk, consisting of 3 sample lessons and 2 tests is available for only $25.00

For more information

Write Mr. I. Watts

SHERIDAN COLLEGE
1430 Trafalgar Road
Oakville, Ontario
Canada L6H 2L1

CIRCLE 182 ON READER SERVICE CARD

MICROSTAT
NOW AVAILABLE FOR CP/M*

MICRDSTAT, the most powerful statistics package available for microcomputers, is completely file-oriented with a powerful Data Management Subsystem (DMS) that allows you to edit, delete, augment, sort, rank-order, log and transform (11 transformations, including linear, exponential and log) existing data into new data. After a file is created with DMS, Microstat provides statistical analysis in the following general areas: Descriptive Statistics (mean, sample, and population S.D., variance, etc.), Frequency Distributions (grouped or individuel), Hypothesis Testing (mean or proportion), Correlation and Regression Analysis (with support statistics), Non-parametric Tests (Kolmogorov-Smirnov, Wilcoxon, etc.), Probability Distributions (8 of them), Crosstabs and Chi-square, ANOVA (one and two way), Factorials, Combinations and Permutations, plus other unique and useful features.

MICROSTAT requires 48K, Microsoft MBasic with CP/M and is sent on a single-density 8" Disk. It is also available on 5" diskettes for North Star DDS and Basic (32K and two drives recommended), specify which when ordering. The price for Microstat is $250.00. The user's manual is $15.00 and includes sample data and printouts. We have other business and educational software, call or write:

master charge
ECOSOFT
P.O. Box 68602
Indianapolis, IN 46268
(317) 283-8883

CP/M is a registered trade mark of Digital Research

CIRCLE 154 ON READER SERVICE CARD

START

Educational Software Directory

APPLE II EDITION

APPLE COMPUTER INC. says, in announcing their *Apple Seed Computer Literacy Kit for Schools: "EDUCATIONAL SOFTWARE DIRECTORY,* another new publication from STERLING SWIFT, is the comprehensive bibliography of educational software for Apple Computers. It indexes software by grade level and provides short descriptions, sources and prices of the software package."

SS SS

RESPONSE HAS BEEN OVERWHELMING. Please order quickly, directly from Sterling Swift Publishing Company.
Dealer price $11.95, less usual discount
Educational price $9.95
Add $1 for postage & handling; Texas residents add 4% sales tax
Name _____
Address (school, if applicable) (street, city, state, zip) _____

STERLING SWIFT PUBLISHING COMPANY
P. O. Box 188, Manchaca, TX 78652—(512) 444-7570

CIRCLE 224 ON READER SERVICE CARD

COMPUTER EQUIPMENT & SOFTWARE BARGAINS

EVERY MONTH

BUY, SELL OR TRADE ALL TYPES OF COMPUTER EQUIPMENT AND SOFTWARE (pre-owned and new) among 20,000 readers nationwide.

FEATURES:

- Low classified ad rates - 10¢ a word
- Hundreds of ads from individuals
- Categorized ads so you can find them instantly
- Large (11 by 14") easy to read pages

Subscribe now for $10 and receive 13 issues/year (one FREE plus 12 regular issues). After receiving your first issue if you're not completely satisfied you may have a 100% refund and you still keep the first issue free. Bank cards accepted.

BONUS: *If you have something to advertise (pre-owned or software) send in a classified ad with your subscription and we'll run it FREE.*

The Nationwide Marketplace for Computer Equipment
COMPUTER SHOPPER
P.O. BOX # 7 • TITUSVILLE, FL 32780 • 305-269-3211

MasterCard & VISA subscriptions only - call TOLL FREE 1-800-528-6050 Ex. 299

CIRCLE 128 ON READER SERVICE CARD

ws... reviews... revi

(2) acquire an understanding of the managerial and social implications of computer usage." the preface continues. "The purpose of this book is to provide the broad managerial orientation which is needed."

The book explains why a knowledge of information processing is required (and in so doing introduces some of the basic concepts of information processing). points out the managerial implications of computer usage. discusses some of the ways in which computers may possibly influence the society in which managers live and work. and provides relevant excerpts from leading publications.

Chapter 3 is an orientation chapter on the implications of computer usage for management and society. Chapters 4 through 7 examine the problems and issues in planning. organizing. staffing and controlling. Chapter 8 considers the use and impact of computers in non-profit organization such as those in the fields of health. law. government. and social services.

The relevant excerpts. taken from publications such as the *Harvard Business Review. Datamation.* and the *Journal of Systems Management.* take up about half of each chapter. and comprise the more interesting half of the book. because most of them discuss real issues and problems. while the rest of the book is more concerned with tutorial material.

Introduction to TRS-80 Level II Basic and Computer Programming. by Michael P. Zabinski. Prentice-Hall Inc.. Englewood Cliffs. NJ. 198 pages. hardcover $14.95. paperback $10.95. 1980.

If you were to pick up this book in a computer store. you might put it down after looking at the first couple of pages. The preface and introduction are solid masses of type. as is most of Chapter 1. the beginning of which sounds as though written by a computer.

But hold on! Starting with page 6. it suddenly blossoms into a fine book on Basic. with many examples accompanied by highly useful line-by-line comments. excellent flowcharts accompanied by line numbers. and over 200 end-of-chapter exercises with back-of-the-book solutions to the even-numbered ones.

Before long. you realize that Dr. Zabinski has had a great deal of teaching experience. According to the back cover of this book. which is indeed "ideal for the beginner who wants to learn about computers without wishing to become an expert." he is "founder and director of the only computer camp for youngsters in the United States."

The ten chapters are: Your TRS-80 Computer. Specifying Information. Computer Programs. Decision. Looping. Input-Output. Library Functions. Subroutines. Graphics. and Strings. Three appendices provide Error Messages. Reserved Words and a Basic Glossary.

A feature of this book that may be unique is the presentation here and there. of lines to be entered into the TRS-80. with space for the reader to fill in both the "anticipated display" and the actual "display." This is a fine progress check.

This could well be the best book on TRS-80 Level II Basic.

Beat The Odds: Microcomputer Simulations of Casino Games. by Hans Sagan. Hayden Book Co.. Rochelle Park. NJ. 222 pages. paperback $7.95. 1980.

At first glance. this book seems to be about how to win when you gamble. Then you see the subtitle in smaller print. and find it's actually a collection of programs for playing casino games.

The five games are trente-et-quarante (30-and-40, mainly a European casino game), roulette, chemin-de-fer, craps, and blackjack.

Each of the five chapters begins with a RUN of the game, then explains the rules of the game, tells what to bet and how to go about it, discusses the Basic program, and provides modifications of the program (such as adding "hop bets" to the craps program).

Four appendices provide a tutorial on probability, a brief discussion of relevant differences in several Basic dialects, a Classification of Bet in Ascending Order of Expected Losses (you can expect to lose $5.84 per $1,000 bet in craps on a "don't pass" bet laying double odds, and $166.67 per $1,000 betting on 11 in craps), and a French-English Mini-Vocabulary (including *monstre, gagner, perdre, prison, and Dieu*). The 14-item bibliography includes *Scarne on Cards*, and Ian Fleming's *On Her Majesty's Secret Service*.

The book starts with a quotation in German from Goethe's *Faust*, and the reader may suspect that Prof. Sagan (of North Carolina State U) is going to swamp him with a highly technical and academic discussion of the games. Not at all: the writing is down-to-earth, highly conversational, and also greatly detailed. For example, the roulette chapter discusses six betting systems in addition to the 13 ways of betting.

A fascinating book, both program-wise and game-wise. Faites vos jeux!

Understanding Your PET/CBM, Volume 1: Basic Programming, by David E. Schultz and Donald L. Smith. Total Information Services. Box 921, Los Alamos, NM 87544. 248 pages, paperback $15, 1979.

According to the preface, this is not a Basic programming guide "but rather a tutorial presentation on how Basic works on the PET."

According to the introduction, "This workbook gives a series of exercises that show the new user how to use the Commodore PET 2001 computer. The most effective way to use the workbook is to sit down with a PET and do the exercises as they are presented. Enough space has been provided in the workbook for you to add your own examples as you develop them."

The seven chapters are an Introduction, Getting Started With Your PET, String and Array Handling, Control and Logic Statements, Cassette, Miscellaneous (internal clock, random-number generator, etc.), Difference Between the Old and the New Roms.

Three appendices provide information on Number Systems, Character Sets, and Program Listings (seven programs referenced in the text).

The workbook assumes the reader knows something about the syntax and semantics of Basic, and lists five books for those who don't.

Some of the exercises are to be done by rote, and as you learn more about a feature, the exercises take the form "What would you get if you typed this?" The next level suggest that you try various type-ins, and the last level is do-it-yourself, with guidelines provided for writing the programs.

The exercises in this self-published workbook are good and plentiful, surrounded by a great deal of excellent explanatory text.

This book combines the material published several years ago in a series of workbooks, at $4 or $5 each, on PET programming. The introductory and ROM chapters were added.

The original workbook on PET graphics is not included in this workbook, because the authors wanted to keep it to a "reasonable length," and because they felt the subject deserved a book of its own, which is in the works along with another on assembly language. □

HOW TO START A COMPUTER BUSINESS

"Computer Business Opportunities 1981" annual report covers the best moneymaking ventures - consulting, software packages, dealerships, systems houses, services, repping, maintenance, vertical markets and much more - plus 20 steps on how to start, where to be in the 80's, the small business market, common entrepreneur's mistakes, financing, marketing, competing with biggies, directory of services and self-help sources, going part-time to full-time. Nowhere under one cover is a better industry perspective for self-employment planning. Contents from key back-articles of "Computer Opportunies," the entrepreneur's newsletter since 1978, "Low Capital Computer Business Guide" (10,000 copies sold), and continuous research from our field seminars. Over 200 pages ring-bound, $65.00, check, Visa, Mastercharge, or written company P.O. 30 day refund guarantee.

DATASEARCH INCORPORATED
4954 William Arnold Road / Dept. G
Memphis, Tennessee 38117
For faster service on credit card orders, phone 901/761-9090

CIRCLE 151 ON READER SERVICE CARD

Sorcerer™ Support!

WORD PAC PLUS adds several features to the Exidy Word Processor Pac. Includes column math, odd/even page numbering, centering, decimal tabulation, software for the Triangle Systems clock card (available June 1981), serial port software, and TRUE proportional spacing on Centronics 737 and daisywheel printers. Works with cassette and Exidy disk systems. **$49.95**

MICROTONE improves typing speed and accuracy by providing audible keyboard feedback each time a character is accepted by the Sorcerer. Works with repeat key. Plug-in installation. **$29.95**

EXIT CABLE neatly connects Centronics and serial printers to the Sorcerer. Handshaking lines added to the Sorcerer RS232 port and complete serial port software lets you use any serial device. A Centronics printer socket and removable dual cassette cables with switchable motor control for rewinding are also included. Works with cassette and Exidy disk systems. **$79.95**

Triangle Systems products include tutorial manuals. Specify cassette or disk (add $2.00). Shipping: $3.00; $6.00 overseas. Add 5.5% sales tax in Ohio. Send check or US money order to:

Triangle Systems

Box 44026 Columbus, Ohio 43204 (614) 272-8201

Sorcerer™ is a trademark of Exidy Systems, Inc.

CIRCLE 238 ON READER SERVICE CARD

Endangered Species

Thirty-six different issues and not one has yet learned to breed in captivity. Their days in our warehouse are limited. Could you provide a good home for a magazine? In exchange, you're assured hours of reading pleasure. And, before they disappear, find the missing link in your own collection.

The applications, programming techniques, simulations, problems, commentary, articles and fiction are practically timeless. Not only that, but the earlier issues are actually increasing in value.

Prices are $2.50 each for all issues after March 1980. $2.00 each for all other issues. $5.00 for three. $15 for ten. Postage is $1.00 for up to 3 issues, $2.00 for 4 or more. Best bet is the **Super Special**: One of everything we have—36 magazines in all—for only $50 post paid.

creative computing

Vol. 3, No. 4—July/Aug 1977

Four Dynamic Games: Eliza (in Basic), Bocce Backgammon and UFO; First Part of Dwyer's 8-Hour Course in Basic—Writing Your Own CAI; "Structuring the Lesson to the student;" Interview with Lee Felsenstein, Designer of the SOL (and several machines since!); Computers in Medicine and Health Care; Evaluations: Spacewar and TRS-80; Sherlock Holmes and Charles Babbage.

Vol. 4, No. 4—Jul/Aug 1978

Features on Business Computing and Word Processing; Special Section on Interfacing Your Computer to the Outside World; Three Perspectives on Video Games; ROM Section; High Resolution Graphics for Apple II; GAMMON and EVILK Motor Cycle Jump Game Programs; Evaluations: Pet; Apple II; Atari Video Pinball; Atari Video Computer.

Vol. 3, No. 5—Sept/Oct 1977

Dynamic Debugging System for 8080 Assembly Language; Bibliography of "Limits to Growth" Models; Dwyer 8-Hour Course in Basic—Part 2: Programming Approaches to Solving Complex Equations; Computerized Conferencing; Symmetric Art on your Computer; Games: Nomad, Rotate Lissajous; Evaluations: 5 Microcomputer Basics; Software Technology; Music System.

Vol. 4, No. 5—Sept/Oct 1978

Educational Features; 4 Simulation Articles; Accounts Receivable Systems; Real World Games; A Real-Time Clock You Can Build; All about PASCAL; Intelligent Videodiscs; 40 Programming Ideas; ROM Section; Hex and Star War Games; Evaluations: Exidy Sorcerer; Radio Shack TRS-80, Bally Arcade; Speak & Spell and Spelling B; Computalker Speech Synthesizer; Peninsula Pet Cassettes; Merlin Video Interface.

Vol. 3, No. 6—Nov/Dec 1977

Programming Techniques: File Structures; CAI; Multiple Problem Types; Computer History Quiz; Final Exams by Computer; Dwyer 8-Hour Course in Basic—Part 3; Mastermind II; Othello and Inorganic Chemistry Programs; Evaluations: Nine Microcomputer-based Toys; Comp IV; S-100 Compatible Kits; IDI Atari; and Three 8080/8K Bases.

Vol. 4, No. 6—Nov/Dec 1978

Consumer Computers Buying Guide; Critical Path Analysis; Experiment in Teaching Strategic Thinking; ROM Section; Subject Index and File Index in Basic; Programs for Mail Lists, Patterns, Plotting, Corral, Joust, Puzzle, and a Christmas Letter; Evaluations: CP/M Disk Operating Systems; North Star Horizon; Backgammon Computers; Smart Electronic Games and Video Games.

Vol. 1, No. 4—Jan/Feb 1978

Fast Sorting Algorithm; How to Write a Computer Simulation; More File Structures; LOGO; Murphy's Laws; Dwyer 8 Hour Course in Basic—Part 4; Programs for World Population Model; Biorhythms in Basic and APL; Yahtzee; Van Gam; Kirkof, and Network; Evaluations: 3 Electronic Games; Radio Shack TRS-80; Heath H8 System.

Vol. 5, No. 1/January 1979

Computers and Robots in Fiction; Guidance Counselor System; Survey of Educator's Attitudes; How to Hide Your Basic Program; A Program to Calculate Depreciation for Taxes, and the Space Maze Game; Counterfeit Cursor and Speed Reading for the Pet; Evaluations: Microsoft Fortran 80; Structured Programming with Tiny c; Smoke Signal's Text Editor; Exidy Sorcerer; Ohio Scientific Superboard II.

Vol. 5, No. 2—February 1979

Multiple Regression Analysis Simplified; Budget Management; Sports Predictions; PEEKing and POKEing for Video Displays; Interview with Michael Shrayer; Computers and Education—Questions of Value; Game Programs for Gold Mine and Atom 20; Evaluations: Heathkit H-8; Thinker Toys Floppy Disk; Electric Pencil; Western Digital Pascal Chip Set; Four Computer Music Records.

Vol. 5, No. 3—March 1979

Six Articles on Data Base Management; Sports Judging on a Microcomputer; Shopping for a Payroll System; Programming the Game of Go; Business Computing with the Sorcerer; Social Science Survey Program; Evaluations: Terrapin Turtle; Videobrain; Pet Monitor; TRS-80 Floppy Disk; Apple Floppy Disk.

Vol. 5, No. 4—April 1979

Safeguarding Your Computer; Interpretive Programming; Elements of a Good Computer Game; Music Composition; Marin Computer Center; Programs for An Intelligent Calendar, Vertical Graphs and Bar Graphs, Flowers for the PET; Evaluations: Checker Challenger; Video Checkers; Checkbook Maintenance System; Whatsit Data Base Management Program.

Vol. 5, No. 5—May 1979

Word Processing Systems; Pilot Tutorial; Writing User-Oriented Programs; Amortization Schedules; Reading and Comprehension Exams; Hiding Your Basic Program, Cribbage and Mille Bornes Game Programs; Evaluations: WP Daisy Word Processing, Wordmaster Text Editor; PDI IQ Builder; Malibu 160 Line Printer.

Vol. 5, No. 6—June 1979

Eight Articles on Computer Graphics and Plotting; Using Basic Strings; Microcomputers in the Hospital; Billing Program for the Sorcerer; Inkblot and Greed Game Programs; Evaluations: TRS-80 Voice Synthesizer; HPLOT Digital Plotter; Structured Systems; Name and Address Program; ALF: Apple Music Synthesizer.

Vol. 5, No. 7—July 1979

Four features on Sorting, Files and Data Bases; Creativity Test; World Power Systems; Personal Finance Model; Two Ecological Simulations; Programs for an Ecological Game, Niche, Brain Teaser, and Zone X; Evaluations: BrighterWriter, SWTPC CT-82 Graphics Terminal; APF PeCos One; Heuristics Speechlab; Micro Pro Super Sort; Diagnostic Programs for the Pet.

Vol. 5, No. 8—August 1979

Can Computers Think?; 5 Basic Language Programming Techniques; The Law and Your Computer; muMath; Image Processing; Manipulating Pencil Files; Adventure, a new type of computer game simulation; The Games HVOLT and FORT; Evaluations: Texas Instruments 99/4; Radio Shack TRS-80 Model II; SWTPC PR-40 for the Pet; IMSAI VIO.

CREATIVE COMPUTING

Vol. 5, No. 11—November 1979

Adventure: Complete Listing in Basic. Controlling Household Devices: Car Pooling; Mumps language; Computer Art Exhibition; Build Your Own Joysticks; Telephone Dialer for TRS-80 or Northstar; Teacher-Made Tests; Evaluations: Comparison Chart of 6 Popular Personal Computers: Comparison of 26 Single Board Computers; Electronic Games & Toys: Quick Printer II; Interact Computer; User-Definable Character Generators; TRS-80 Level III Basic; Pet Software from Creative Software; Word Processor; Intrel X-10 Home Control System

Vol. 5, No. 12—December 1979

Controlling Household Devices: Part 2; LOGO; Computerized Biofeedback; Computers at the Rodeo; Creating Digitized Video Images; Programs for using the Microcomputer as an Investment Tool; Animation on the Apple, Magic Tricks; "Turn-Key" CP/M System; Evaluations: More Electronics Games; Language Translators; APF MP1000 Video Game System; 6 Word Processing Printers; Satellite Tracking Software; SysKit for the 8080; Assemblers: CP/M vs. TSC; Statistics for the TRS-80.

Vol. 6, No. 1—January 1980

Interviews with Donald F. Knuth and William Wulf; Six Features on Artificial Intelligence; Air Traffic Controller; Computerized Resume; GROW: A Program that Learns; Evaluations: Six Basics; NEWDOS and TRSDOS; Auto Scribe; Micro Music.

Vol. 6, No. 2—February 1980

Six Articles on Investment Analysis; David Levy; Intelligent Computer Games; Programs: Consolidation, Graphing, Genetics; Evaluations: Word Star vs Electric Pencil; Pascal for the TRS-80; Micro Composer, Data Dubber; Sorcerer Word Processing Pac; Trivia Contest Results

Vol. 6, No. 3—March 1980

Networks for Personal Computers, Artificial Intelligence; How to Make a Basic Tree; Interview with Joel Birnbaum; Three Mile Island Game, Extended Precision Computing; Rolodex' Data Base Program; Photographing Your Computer System, Evaluations: TI 99/4; Modems, Cobol, Tiny c, 10 Software Packages.

Vol. 6, No. 4—April 1980

Dr. KiloBYTE's Creative Popular Personal Recreational Micro Computer Data Interface World Journal—the Famous 73 page April Fool parady. 8 Articles on Reading and Language; Interview with Gordon Bell; Evaluations: Heath WH-89; Atari 800 vs PET; Chatworth Mark Sense Card Reader; Adventure.

Vol. 6, No. 5—May 1980

Seven Features on Saving Money with your Computer; Analysis of Stock Options, Budeeting Model, Shopping Lists, Home Inventory, Home Purchase, Retirement Planning, Computer-Aided Model Rocket Design; Two Natural Language Systems; Evaluations: PET 2022 Line Printer, APF Imagination Machine; Personal Software's Desktop Plan; Universal Data Entry System.

Vol. 6, No. 6—June 1980

Fourteen Graphics Articles: Polar Plots, 3D Graphics, Animation, Graphic Mazes, Motion Simulation, Inside Space Invaders, 7 Music Articles, Digital Audio, Computer-Aided Sight Reading, Design of a Synthesizer, Digital Enhancement of Old Recordings, Comparison of Printers; Evaluations: The Atari Machine, Neelco's Muse Box for the PET; HeathKit-Thomas Electronic Organ Kit

Vol. 6, No. 7—July 1980

Four Articles on Adventure Games: Dragon, Dungeon, How to Fit a Large Program into a Small Machine, How to Write an Adventure; 6 Simulation Features: Genetics, Electric Management, Medical, Ecological, Sports, Self-Reproducing Programs; Man-Machine Dialogs; Selecting a Computer Dealer, Evaluations: Super-Text vs. Easy Writer; Mountain Hardware ROM PLUS+; Toolkit for the Pet; Chart Comparing Basics of 8 Popular Computers.

Vol. 6, No. 8—August 1980

Games Features: Computer Bismarck, Knights Tour, Guess My Animal, Turnablock Game, Fifteen and Hot, Mind Exerciser, Marketing Your Own Program, Computer Graphic Designs; Robotics Conference; Insertion Sort; Stocks and Listed Options. Evaluations: Magic Wand; VisiCalc, Beta-80; Asteroids in Space.

Vol. 6, No. 9—September 1980

Twenty Educational Applications and Features: Language Arts CAI Development, Grading Program, Computers in the Classroom, Asimov: Point of View: How to Heapsort; New Consumer Electronic Products; TRS-80 Shopping List for Schools. Evaluations: Milliken Math Sequences; Exatron Stringy Floppy; EDS Videotape Series "Little Computers Sez How They Run"; 8 Apple II Software Packages; Educational Packages.

Vol. 6, No. 10—October 1980

Symposium on Actor Languages and Smalltalk; Linked Merge Sort; How to Solve It; 9 New Applications and Games; Election Prediction, The Presidential Campaign, Computer Division Evaluations: OSI C2-4P Computer, TRS-80 Voxbox, Two Text Editors, Five Music Systems, 15 Software Packages, BASF X

Vol. 6, No. 11—November 1980

Actor Languages and Smalltalk—Part 2; Effective Documentation; Bomb-proof Data Entry; Interactive Systems and Virtuality, Fast Sorting; Controlled Input in Basic; Loosening Packed Basic; Flavors of Small Business Computing, Planning Your Diet. Evaluations: Electronic Games: Computer Ambush; TR Cops.

Vol. 6, No. 12—December 1980

A Comparison of Basic Systems; Buying Guides to Personal Computers and Electronic Toys and Games; Legal Protection of Computer Programs; Nuclear Power Plant Simulation; Superman Game; Logic Problem Solver; Interview with the inventor of the ZX80, Clive Sinclair; Alvin Toffler: The Electronic Cottage. Evaluations: Sinclair ZX80, Atari; Apple Pascal, CBM2022 Smart Printer, Pearl, Apple II and Apple II Plus, Pet, TRS-80.

July 1977

SOL, The Inside Story, Braille and the Computer Video Newspaper; A Chip is Born; The Care and Feeding of Your Home Computer; Digital Foam the peripheral of the future

August 1977

The Kit and I, Part I, by someone who's never soldered before; Introduction to the Fundamentals of Computer Memory, Tips for the Do-it Yourself Hardware Beginner; Binary clocks, APLomania.

September 1977

Xeroxes and other hard copy off your CRT, Payroll Program; How Computers Work, The Kit and I, Part II or Power to the Computer; CCD's, How They Work and How They're Made, A look at PLATO, an Educational Computer System, IBM 5100.

October 1977

Binary Arithmetic For the Beginner, Microprocessor Aid for the Deaf and Blind; The Kilobyte Card, Scott Joplin on Your Sci-Fi Hi-Fi; Building a Basic Music Board, Flowcharting, Payroll Program.

November 1977

Solar Energy Measurement, A Beginners Introduction to BASIC, The Kit and I, Part III, More Music to Play on Your Computer, Micro Maintenance Solomon and Viet Putting Together a Personal Computing System, Time Sharing on the Family MICRO.

December 1977

A Beginners Guide to Peripherals, The Best Slot Machine Game Ever; Artificial Intelligence?; An Electronic Jungle Gym for Kids; File Copy Program, Better Health Through Electronics; The Kit and I Part IV.

January 1978

Synthetic Skin for Your Robot and How to Make It; TLC, A Visual Programming Language, The Code That Can't Be Cracked, Beginner's Guide to Computer Graphics, The Computer and Natural Language, Intel-Timer's Guide to Circuit Board Etching.

index to advertisers

Reader Service	Advertiser	Page
102	Aardvark Technical Service	77
103	ABM Products	122
101	Acorn Software	21
148	Advanced Computer Products	97
104	Adwar Video	201
*	ALF Products Inc.	51
107	Alpha Supply Co.	157
108	American Custom Electronic Systems	142
105	American Square	181
111	Apple Computer	10
*	Apple Computer	94
108	Apple Jack	157
109	ASAP	174
118	ASCII	219
114	Atari	41
115	Atari	59
110	Automated Simulations	9
116	Avant-Garde Creations	157
117	Barclay Bridge Supplies	153
112	Basics & Beyond	219
251	Beagle Bros.	129
121	The Book Co.	81
129	Broderbund Software	159
119	C & S Electronics	217
132	Cavri Systems	31
130	Charles Mann & Associates	157
113	Cload Magazine	61
126	Comm Data Systems	181
148	Components Express	97
127	Comp-U-Con	99
147	Compumax	201
134	Computer Applications Unlimited	83
135	Computer Comp East	153
141	Computer Exchange	123
124	Computer Information Exchange	24
143	The Computer Kitchen	213
139	Computerland	93
123	Computer Plus	124
140	Computers "R" Us	73
128	Computer Shopper	222
145	Computer Specialties	28
149	Computer Station	201
*	Computer Store of the Month	188
137	Computronics	114-115
138	Computronics	105
140	Consumer Computers Mail Order	73
148	Corvus Systems	cover 3
181	Cottage Software	191
171	CPU Shop	103
*	CPM Users Group	181
179	Cursor	86
125	Dakin5 Corp	101
120	Dakin5 Corp	7
122	Dakin5 Corp	36
151	DataSearch Inc	223
184	Digibyte Systems Corp.	109
131	Discount Software Group	148
153	Disk-O-Tape	213
158	D.J. A.I. Systems	111
136	Dynacomp	111
154	Ecosoft	221
164	Edu-ware Service	25
142	Electronic Specialists	161
218	Electronics Systems Furniture	29
150	Exatron	15
159	Frederick Computer Products	181
*	Galaxy	181
*	Galaxy	203
198	Global Parameters	159
199	Gulf Breeze Computer Store	211
205	Hayden Book Co.	183
206	Heath Co.	35
*	Heath Co.	33
144	Huntington Computing	149
208	Infoworld	159
207	Integral Data Systems	44
160	Interactive Fiction	185
173	Investors Software	54
209	Iridis	211
220	Island Cybernetics	181
178	Kogyosha Co. Ltd.	83
219	Kreil Software	19
234	Lifeboat Associates	13
235	Lifeline	5
185	Link Systems	185
182	Magnolia Microsystems	182
185	Mark Gordon Computers	187
181	Masterlype	159
221	Med Systems Software	145
228	Meta Technologies Corp.	171
187	Micro Ap	39
155	Micro Lab	141
152	Micro Lab	143
158	Micro Lab	145
183	Microlearningware	209
183	Micro Management Systems	215
182	Micro Math	221
188	Microsoft Consumer Products	43
243	Microstand	203
247	Microsystems	137
244	Micro Technology Unlimited	85
233	Microtrend	217
245	Microworks	143
157	Mini Micro Mart	53
181	Mississippi Micro	213
196	Monroe Systems for Business	89
191	Mountain Computer	1
225	Muse Software	29
228	Muse Software	175
253	NEC America	18
197	Nibble	135
174	Lawrence Norton	142
172	Ohio Scientific	cover 4
211	Okidata Corp.	49
213	Omega Sales	119
248	On Line Systems	50
249	On Line Systems	139
248	On Line Systems	203
250	Orange Micro	121
188	Orion Software	162
218	Pacific Exchanges	127
189	Pacific Exchanges	191
204	Pacific Exchanges	160
186	Pan American Electronics	180
217	Pelican Programs	182
239	Peripherals Plus	147
239	Peripherals Plus	155
239	Peripherals Plus	207
239	Peripherals Plus	183
*	Personal Computer World	189
170	Personal Software	2
222	Poly Paks	183
*	Prentice Hall, Inc	83
223	Process Control Technology	185
214	Program Design	139
175	Program Store	87
255	Prometheus Products	58
195	Quality Software	193
188	Racet Computes	107
*	Retail Roster	189
258	Rochester Data	173
258	Simutek	220
259	Sliwa Enterprises	85
194	Small Business Applications	178
229	Softech	71
230	Softech	187
262	Soft-tools	173
190	Software Exchange	67
183	Software Exchange	cover 2
210	Software Technology for Computers	125
227	The So Ho Group	220
203	Southwestern Data	197
189	Spectrum Software	89
212	Jeanne St Auber	185
283	Stereo House	211
224	Sterling Swift Publishing	222
284	Stocking Source	75
265	Stoneware	131
201	Strategic Simulations	133
200	Strawberry Software, Inc	193
187	Sublogic	27
288	Supersoft	197
231	Survivor Software	211
215	Sync	185
232	System Software	91
238	Taranto & Associates	217
202	Tarbell Electronics	173
237	3G Co.	172
193	Total Information Service	178
181	Transnet	176
238	Triangle Systems	223
240	Video	57
242	Vista	179
148	Vista Computer Co.	97
18	Vocetek	177
241	John Wiley & Sons	177
192	Xtra-Soft	177

Creative Computing

300	Apple Software	23
300	Apple Software	205
300	Atari Software	213
350	Back Issues	224-225
350	Basic Computer Games	195
350	Be A Computer Literate	81
350	Best of Creative Computing	184
350	Computer Coin Games	182
300	Creative Computing Index	172
350	Creative Computing Book Service	172
*	Logicstick Gameway	95
300	TRS-80 Software	199
300	TRS-80 Software	79
350	T-Shirts	180

*Write advertiser directly

puzzle answers

The Rearranging Bee:

(A) Poland (F) Thailand
(B) Scotland (G) Trinidad
(C) Alaska (H) Nicaragua
(D) Bulgaria (I) Australia
(E) Nepal (J) South Africa

The Blockhead Puzzle:

The 26 Cross:

```
    44    55    66
  9449  8558  7667
  4994  5885  6776
    99    88    77
```

The New Door Puzzle: Rearrange the letters to spell *ONE WORD*.

Lead To Gold: LEAD, MEAD, MELD, MOLD, GOLD.

Alice in Puzzleland:

The Ten Minute Puzzle: The ages are 9, 2, 2. (If clue #2 is not enough, then obviously there must be at least 2 combinations of product sum that are identical. In fact the *only* double combinations are ages 6,6,1 or 9,2,2 — both products are 36 and both sums are 13. Clue #3 eliminates 6,6,1.

A Simple Addition:

```
  417
+9450
 9867
```

A Fine Old Saying: Start with the *A* on the right side and move clock-wise. The proverb is A WATCHED POT NEVER BOILS.

May 1981 • Expires August 1, 1981

creative computing

(Please Print)

Name _____

Title _____

Address _____

City _____

State _____ Zip _____

1. How old are you?
A. Under 20
B. 20-29
C. 30-39
D. 40-49
E. 50-59
F. 60 and over

2. What level of education have you completed?
A. Some high school
B. high school graduate
C. Some college
D. Associate's degree
E. Bachelor's degree
F. Master's degree
G. Doctoral degree

3. What is your occupation?
A. Business owner, officer, manager
B. Computer owner, other businessperson
C. Engineer, scientist, mathematician, technician
D. Educator
E. Student
F. Professional (consulting, law, medicine, etc.)
G. Other

SUBSCRIPTIONS TO CREATIVE COMPUTING

New ☐ Renewal ☐

Term	USA	Canada and Foreign surface	Foreign air
3 yrs (36 issues)	☐ $53	☐ $80	☐ $143
2 yrs (24 issues)	☐ $37	☐ $55	☐ $97
1 yr (12 issues)	☐ $20	☐ $29	☐ $50

For a change of address, please attach old label

BOOKS, POSTERS, RECORDS, GAMES

Quan.	Cat.	Title	List Price	Total
	3G	Binary Dice	$1.25	
	6A	Best of Creative Computing-Vol. 1	8.95	
	6B	Best of Creative Computing-Vol. 2	8.95	
	12C	Best of Creative Computing-Vol. 3	8.95	
	6C	Basic Computer Games	7.50	
	6C2	More Basic Computer Games	7.50	
	6C4	More Basic Games-TRS-80	7.95	
	6F	Best of Byte	11.95	
	6G	Colossal Computer Cartoon Book	4.95	
	6H	Be A Computer Literate	3.95	
	6Z	Computer Rage Game	8.95	
	9Y	Problems for Computer Solution Teacher's Edition	9.95	
	9Z	Problems for Computer Solution	4.95	
	10R	Computer Coin Games	3.95	
	12A	Katie and the Computer	6.95	
	12D	Computers in Mathematics-A Sourcebook of Ideas	15.95	
	12E	Impact of Computers on Society and Ethics: Bibliography	17.95	
	12B	Tales of the Marvelous Machine	7.95	
	12G	Computers for Kids-Apple	3.95	
	12H	Computers for Kids-TRS-80	3.95	
	12J	Computers for Kids-Atari	3.95	
	CR101	Computer Music Record	6.00	
	RSS	Sorting & Shuffling Reprint	.50	
		SUBTOTAL		

(Please Print)

Name _____

Title _____

Address _____

City _____

State _____ Zip _____

1. How old are you?
A. Under 20
B. 20-29
C. 30-39
D. 40-49
E. 50-59
F. 60 and over

2. What level of education have you completed?
A. Some high school
B. high school graduate
C. Some college
D. Associate's degree
E. Bachelor's degree
F. Master's degree
G. Doctoral degree

3. What is your occupation?
A. Business owner, officer, manager
B. Computer owner, other businessperson
C. Engineer, scientist, mathematician, technician
D. Educator
E. Student
F. Professional (consulting, law, medicine, etc.)
G. Other

SOFTWARE T-SHIRTS BACK ISSUES

Quan.	Cat.	Title	Price	Total

Books, Records, Games _____

$2 USA, $4 Foreign Shipping Charge _____

NJ residents add 5% sales tax _____

Magazine subscriptions _____

TOTAL _____

☐ Check or money order enclosed (U.S. funds only)

☐ VISA ☐ Master Charge ☐ American Express

Card number _____

Expiration Date _____ Signature _____

Name _____

Address _____

City _____ State _____ Zip _____

CCEH

Place Stamp Here

creative computing
P.O. Box 2976
Clinton, Iowa 52735

Place Stamp Here

creative computing
P.O. Box 789-M
Morristown, N.J. 07960

Place Stamp Here

creative computing
P.O. Box 2976
Clinton, Iowa 52735

Corvus Lowers the Price of Admission to the Winchester Club.

Here's the price breakthrough you've been waiting for on Winchester disk systems. It's our new 5 ¼-inch 5-million byte Winchester that adds cost effective mass storage to over 15 of the most popular microcomputers. Now everyone can enjoy the improved reliability, increased storage capacity, and faster speed of sealed-environment Winchester technology.

You can start with 5 million bytes, then expand the system with up to three add-on drives of 5, 10 or 20 million bytes. Our 5 million byte system has all of the advanced features of the larger capacity Corvus systems, including our low cost MIRROR back-up and multi-user CONSTELLATION network that allows up to 64 computers to share the Corvus data base and peripherals such as printers.

Want the full story? Contact your local computer store.

For Apple TRS-80 LSI-11 Zenith
SuperBrain Pet S-100 Bus
Alpha Micro

CORVUS SYSTEMS
2029 O'Toole Avenue
San Jose, California 95131
408 946-7700 TWX 910-338-0226
See us at NCC Booth #3014

CIRCLE 148 ON READER SERVICE CARD

Educator, Entertainer, Accountant.

Your Challenger Personal Computer.

Through the miracle of modern technology, a complete computer as powerful as the multimillion dollar room-sized computers of a few years ago can be put in a package the size of a typewriter and sells for as little as a color television set!

Through its years of microcomputer experience, Ohio Scientific has effectively channeled this tremendous computer power into a "friendly" computer with hundreds of personal uses, via a huge software library of programs for a broad range of personal, home, educational and business use.

This available software allows you to use and enjoy your computer without becoming an expert. The Challenger, however, is a powerful, general purpose computer which can be programmed in several languages by those who choose to.

Here are just a few of the popular uses of an Ohio Scientific Challenger Computer:

Education

The personal computer is the ultimate educational aid because it can entertain while it educates. Software available ranges from enhancing your children's basic math, reading and spelling ability, through tutoring high school and college subjects, to teaching the fundamentals of computers and computer programming.

Entertainment

Many of the Challenger's games educate while they entertain, from cartoons for preschoolers to games which sharpen mathematical and logical abilities. But, entertainment doesn't stop here. The Challenger's graphics capabilities and fast operation allow it to display action games with much more detail than the best video games, providing spectacular action in games such as Invaders, Space Wars, Tiger Tank and more! All popular sports such as golf, baseball and bowling are available as simulated computer games as well as many conventional games such as chess where the computer plays the role of a formidable opponent.

Accounting

Your Challenger computer can keep track of your checkbook, savings account, loans, expenses, monitor your calorie intake and your biorythms.

If you are involved in a business, you can use it to do word processing; accounting, inventory control, order processing, customer lists, client records, mailing labels and planning.

And more:

This may seem like a lot of uses, but it's only the tip of the iceberg for a general purpose computer. For example, your Challenger can be expanded to control lights and appliances, manage your energy usage and monitor for fire and break-ins. Furthermore, it can communicate with you, with other computers and the new personal computer information services over the telephone.

In fact, the uses of general purpose, personalized computers are expanding daily as more and more people discover the tremendous capabilities of these new technological wonders.

Ohio Scientific offers you four personalized computer systems starting at just $479.

For a free catalog and the name of the dealer nearest you, call 1-800-321-6850 toll free.

OHIO SCIENTIFIC
a MICOM Company
1333 SOUTH CHILLICOTHE ROAD
AURORA, OH 44202 • (216) 831-5600

CIRCLE 172 ON READER SERVICE CARD